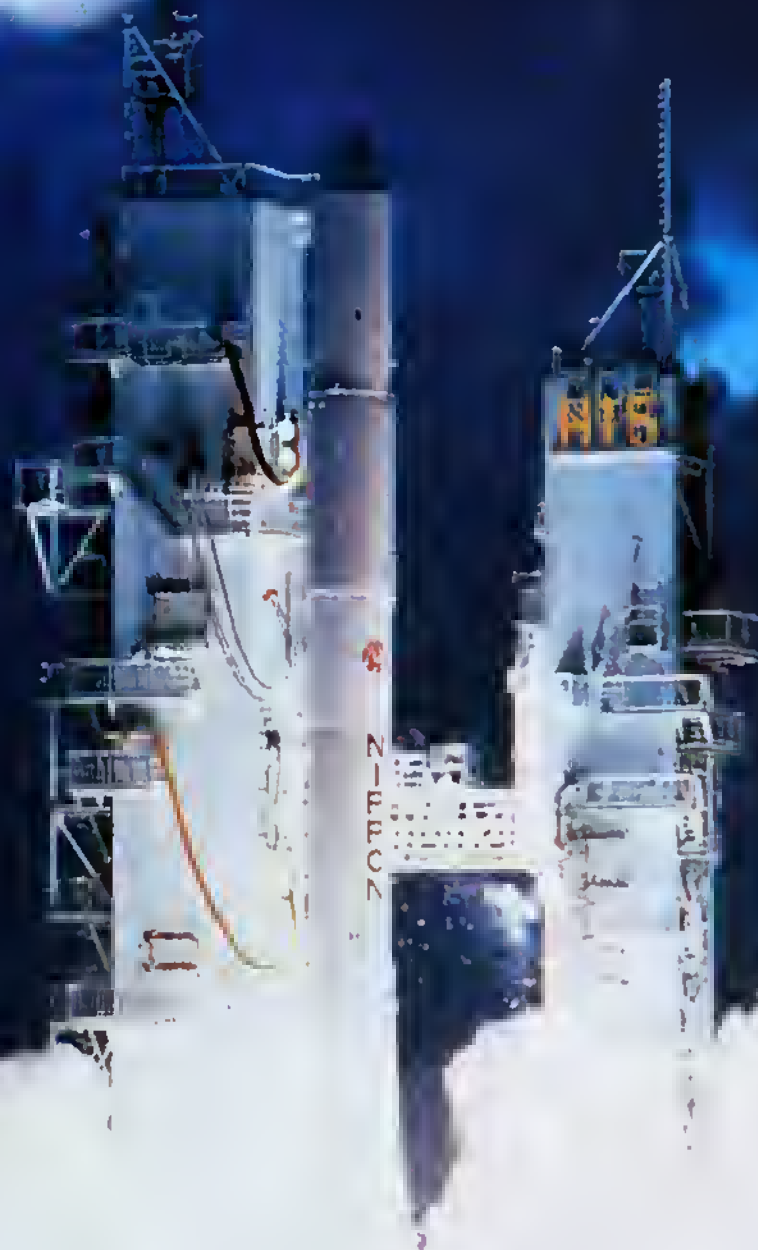


November 1986

RADiO COMMunication



Journal of the Radio Society of Great Britain



Why wait two Years?

That's probably how long you'll wait before another manufacturer can offer you the quality, performance and **UNIQUE** features available in the FT 767 GX.



If we tell you this radio is magnificent — you wouldn't take **our** word for it. Take the good old-fashioned approach and listen around the bands; in no time at all you'll learn why this transceiver is being described by users in glowing terms. 'Wonderful', 'Unbelievable', etc.

What's in this FT 767 GX that places it **so far ahead** of its rivals? YAESU's total dedication and patience in harnessing of advanced technology to produce literally the finest piece of equipment to appear on the Amateur Market.

Here are 6 features unique in amateur radio which you don't have to wait two years for:

- 1] **TX Shift** — Enabling custom setting of the transmit IF bandpass in the SSB modes.
- 2] **Tone Encoder** — To activate the tone-burst or the sub-audible tone generator for FM transmissions.
- 3] **Twin VFOs** — with auto-tracking.
- 4] **RF Amplifier** — Cascading pairs of JFETs for both amplifier and balanced first mixer with up-converting triple superhet.
- 5] **160m-70cm** — First all band (HF VHF & UHF coverage)
- 6] **Auto SWR/Power Meter** — digitally read out.

These **SIX** combined items plus:

- Integral Auto antenna tuner, keyer and power supply.
- Four internal CPUs
- Superb general coverage receiver.

You'll note that transceivers currently available with none of **these** 6 features are available at higher prices — which is entirely due to YAESU's new production methods that guarantee lower cost, higher **reliability** and longer life.

By the way, it provides 100 watts at HF (25 watts AM) and 10 watts VHF/UHF (2½ watts AM) — as we asked originally, 'Why wait 2 years?' — its here, **now** from YAESU!

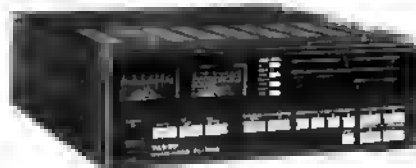
YAESU's super portable twins **FL 7000** — The Shape of Things to Come



FT 290 & FT 690 Mk II —

... destined for even greater success — **AVAILABLE NOW!**

- 'New look' front panel
- Completely new rig with optional 25W p.a. for mobile use, and lots, lots more!
- Super new additions and changes to the world's biggest ever selling amateur transceiver.



- 1.2kW P.E.P. HF Solid State QSK Linear
- Weight only 30kg (66lbs)
- Auto tuning and band changing
- 160m through 10m
- Integral P.S.U.

The Linear with everything

FT 727 R Dual Band Handle... YAESU's experience and patience pays off — they succeeded where others failed

— Hit 'hard-to-reach' repeaters with a punchy 5W plus a wealth of CMOS microprocessor controlled commands

- 20 keys/40 channels
- 2M and 70
- CAT system
- Liquid Crystal meter



THE AE CONNECTION
SERVING THE NATION

• **NORTH**
Holdings 45 Johnston St.
Blackburn Tel 0254 59595

• **YORKSHIRE**
A J Hooker 42 Nether Hall Rd.
Doncaster Tel 0302 25690

• **E ANGLIA**
Eastern Comms, 31 Cattlemarket St
Norwich Tel 0603 667189

E&OE

• **E MIDLANDS**
R A S. Norris, 3 Farndon Green,
Wollaton Park Nottingham Tel 0602 280267

• **MIDLANDS**
Elliot Electronics,
Braunstone Gate, Leicester
Tel 0533 553293

• **SE MIDLANDS**
A J H, 151a Bilton Rd., Rugby,
Warwickshire Tel 0788 76473

• **S WEST**
Uppington, 12-14 Pennywell Rd
Bristol Tel 0272 557732



Open 9am-5pm — 6 days per week



TX 334312
PURLEC G

AMATEUR ELECTRONICS

504 Alum Rock Road, Alum Rock, Birmingham BB 3HX. Tel: 021 327 1497/6313

NOVEMBER 1986

VOLUME 62 No 11



EDITOR
A W Hutchinson

Editorial assistant
N Jackson

Draughtsman
D E Cole

Editorial secretary
Mrs D R Moye

All contributions and correspondence concerning the content of *Radio Communication* should be addressed to:

The Editor, RSGB,
Lambda House
Cranborne Road
Potters Bar
Herts EN6 3JE
Tel 0707 59015

ADVERTISING

Advertisements, other than Members' Ads, should be sent to:

M J Hawkins, G3ZNI,
RSGB Advertisement Officer,
PO Box 599,
Cobham,
Surrey KT11 2QE
Tel 037 284 3955
Presitel Mailbox 372843955

Correspondence concerning the distribution of the journal, and all other Society matters should be addressed to:

RSGB Headquarters,
Lambda House,
Cranborne Road,
Potters Bar,
Herts EN6 3JE
Tel 0707 59015

Business hours: 1000 to 1600

Headline News
Tel 0707 59312 for a recording of the latest amateur radio news

RSGB Data Box (Presitel compatible)
Tel 0707 52242

CONTENTS

- 765 From the secretary's office
- 766 A 1.8MHz auto tuning vertical antenna—T D Forrester, G4WIM
- 770 An eeprom keyer for beacon usage—D J Robinson, G4FRE
- 772 Measurements on modern vhf/uhf front-ends (Part 2)—Ian F White, G3SEK
- 775 A simplistic approach to the design of low-power output stages for cw transmitters—Derek Guy, G3IBH
- 777 Technical Topics—Pat Hawker, G3VA
- 784 Book review—GCHQ—The Secret Wireless War, 1900-86
- 785 Members' Mailbag
- 786 Obituaries
- 787 The International Amateur Radio Union—Yesterday, Today, Tomorrow—Richard L Baldwin, W1RU
- 789 News & Views
VHF/UHF—Ken Willis, G8VR
- 791 HF—John Allaway, G3FKM
- 794 SWL—Bob Treacher, BR532525
- 795 Microwaves—Mike Dixon, G3PFR
- 796 Satellites—Bob Phillips, G4IQQ
- 798 Data Comms—Ian Waite, G3NRW
- 799 Contest News
- 810 Contests Calendar
Club News
- 814 Members' Ads

Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

Radio Communication is published by the Radio Society of Great Britain as its official journal on the first Friday of each month and is sent free and post paid to all members of the Society



36,244 copies per
issue average
circulation in 1985

Closing date for contributions
unless otherwise notified:
five weeks before publication date

©RADIO SOCIETY OF
GREAT BRITAIN 1986

Lowe shops and approved dealers.

Sole Distributor Lowe Electronics Ltd.
Chorltonfield Road, Mallock Derbyshire DE4 5LE.
Tel: 0629 2817, 2430, 4057, 4995.

London Lowe Electronics Ltd.
223/225 Field End Road, Epsom, Middx.
Tel: 01-429 3256.

Glasgow Lowe Electronics Ltd.
4/5 Queen Margaret Rd, off Queen Margaret Drive,
Glasgow. Tel: 041-945 2626.

The North East Lowe Electronics Ltd.
56 North Road, Darlington, Durham.
Tel: 0325 486121.

Cambridge Lowe Electronics Ltd.
162 High Street, Chesterton, Cambridge.
Tel: 0223 311230.

Cardiff Lowe Electronics Ltd.
c/o South Wales Carpets,
98 Clifton Street, Cardiff.
Tel: 0222 464154.

Hants/Dorset Lowe Electronics Ltd.
27 Gillam Road, Northbourne, Bournemouth.
Tel: 0202 577760.

Birmingham Ward Electronics
422 Bromford Lane, Ward End, Birmingham B8 2RX.
Tel: 021-328 6070.

Buckinghamshire Photo Acoustics Ltd.
58 High Street, Newport Pagnall, Bucks.
Tel: 0908 610625.

East Scotland Jaycee Electronics
20 Woodside Way, Glenrothes, Fife KY7 5DE.
Tel: 0592 756962.

Essex Waters & Stanton Electronics
Warron House, 18-20 Main Road, Hockley, Essex.
Tel: 0702 206835.

Essex Arrow Electronics Ltd.
5 The Street, Hatfield Peverel, N. Chelmsford.
Tel: 0245 381673.

Lancashire Stephens-James Ltd.
47 Worthington Road, Lough,
Tel: 0942 676790.

North London Radio Shack Ltd.
188 Broadhurst Gardens, London NW6 3AY.
Tel: 01-624 7174.

West Midlands Dowsbury Electronics
176 Lower High Street, Stourbridge.
Tel: 0384 390063.

W. Sussex Bredhurst Electronics
High Street, Handcross, Haywards Heath, W. Sussex.
Tel: 0444 400786.

Northern Ireland George Moore Electronics
7 Cyprus Avenue, Belfast BS.
Tel: Belfast 658295.

Devon Reg Ward & Co Ltd.
1 Western Parade, Axminster, Devon.
Tel: 0297 34918.

W. Yorkshire Amateur Radio Shop
2/4 Cross Church Street, Huddersfield.
Tel: 0484 20774.

Kent Thomas Electronics Ltd.
2 Stanley Road, Herne Bay, Kent.
Tel: 0227 363859.

the TRIO TS711E & TS811E 2 metres and 70 centimetres base station transceivers



The TRIO TS711E two metre base station is perfection epitomised; receiver sensitivity and the ability to reject unwanted adjacent signals is outstanding. For the serious operator, any other transceiver is unacceptable.

Similar in specification and appearance to the TS711E but operating on seventy centimetres is the TRIO TS811E. When used along side the TS711E, the TS811E completes the ideal equipment line-up and provides the best possible access to the satellites for the VHF/UHF enthusiast.

The TS711E (TS811E) covers the two metre (seventy centimetre) band from 144 to 146MHz (430 to 440MHz). Operating modes are USB, LSB, CW and FM. When switched to the "auto" position the transceiver correctly selects mode according to frequency, a great advantage for the blind operator. Simple up/down frequency shift is provided on the front panels and also on the microphones.

Power output on all modes is 25 watts. For QRP operation the output can be reduced using a front panel control.

The TS711E (TS811E) has IF shift, an essential feature when the band is crowded during a contest. To help work DX, speech processing is also available.

The transceiver has two separate VFO's and forty memory channels. Each memory stores frequency, operating mode, whether simplex or repeater shift and if the 1750Hz tone burst is on or off. The VFO can be either free running as for SSB or CW operation or electrically switched to a "click" stop for FM where it changes

frequency in 12.5 or 5 kHz steps. Frequencies stored in memory can be readily transferred to either VFO A or B. Depending on how the VFO was set when the information was put into memory i.e. click stop or free running VFO, the rig is set the same when the memory information is transferred. It is therefore possible to have SSB frequencies transferred with a free running VFO and FM channels with click stop. A great aid to operating! The second VFO can also be quickly put on the same frequency as the one currently being used, ideal when checking the position of a strong adjacent signal whilst remaining on your operating frequency.

Frequency scan or VFO can either be between or outside user set limits. On memory the transceiver can either scan the entire memory content or by instructed to look at those frequencies of a particular mode. The TS711E (TS811E) has a timed hold on an occupied channel.

Both priority channel and the immediate recall of your local net frequency are possible with the TS711E (TS811E).

For those with failing sight or a blind operator the TS711E (TS811E) is a dream come true; not only is the operating mode identified by the appropriate CW letter sent in tone (F for FM, U for USB etc.) but when fitted with the VSI operational board, a digitally encoded girl's voice will announce both frequency and, where applicable, whether the rig is switched to repeater shift.

DCS (digital code squelch) is also fitted to the TS711E (TS811E).

TS711E.....	£839.96
TS811E.....	£998.00
VSI.....	£30.18

KENWOOD CORPORATION

Shionogi, Shibuya Building, 17-5, 2-chome Shibuya, Shibuya-ku, Tokyo 150, Japan

KENWOOD COMMUNICATIONS

Division of Kenwood Electronics, Deutschland GmbH
Rembrücker Strasse 15, D-6056 Heusenstamm, West Germany

station accessories

TL922 HF amateur band linear amplifier

The TL922 is a class AB2 grounded grid linear amplifier using two high performance EIMAC 3-500Z tubes. It covers 160 to 10 metres for SSB, CW and RTTY modes of operation. Engineering perfection, those who have seen a TL922 will know what I mean. It is one of the few items of amateur radio equipment which is truly hand built by a specialist engineer.



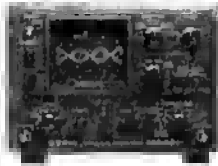
TL922 inc tubes . . . £1350.00 inc VAT, carriage £7.00.

SM220 station monitor

Based on a wide frequency range oscilloscope, the SM220 station monitor features in combination with a built-in two-tone generator, a wide variety of waveform observing capabilities. The SM220 aids efficient station operation as it monitors transmitted waveforms and it also serves as a sensitive wide frequency range oscilloscope for various adjustments and experiments. When fitted with the optional BS8 panoramic display and connected to one of the following transceivers (TS940, TS830, TS180, TS820 series) signal conditions in the vicinity of the receive frequency can be seen over a 40 or 200KHz range.

SM220 . . . £286.35 inc VAT, carriage £7.00

BS8 . . . £72.05 inc VAT, carriage £1.50



amateur band transceivers

TS830S HF amateur bands transceiver

Needing no description, the TRIO TS830S, which uses a pair of 6146B valves in the PA, is well known on the amateur bands (160 to 10 metres) for its superb signal quality. Modes of operation are USB, LSB and CW. Having variable bandwidth tuning, H notch, IF shift and provision for various filters, its receive performance is excellent too.



TS830S . . . £981.59 inc vat, carriage £7.00

TS530SP HF amateur bands transceiver

An HF amateur bands (160 to 10 metres) valve transceiver without frills but providing today's amateur with all the necessary facilities for reliable worldwide communication. Modes of operation are USB, LSB and CW.



TS530SP . . . £849.82 inc vat, carriage £7.00

send for the
TRIO
general catalogue

All advertised prices subject to exchange rate variations

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

RADIO COMMUNICATION November 1986

amateur band plus general coverage transceivers

TS940S HF transceiver with general coverage receiver

Top of the range, the TS940S has every operating feature that the discerning HF operator needs. Amateur bands from 160 to 10 metres plus a general coverage receiver tuning from 150 kHz to 30 MHz. Modes of operation are USB, LSB, CS, AM, FSK and FM. Forty memory channels, each effectively a separate VFO and easy keyboard frequency entry make operation and ownership of the TRIO TS940S a pleasure.



TS940S . . . £1895.00 inc vat, carriage £7.00.

TS930S HF transceiver with general coverage receiver

Much has been said and written about the TS930S and it now has a place high in the affection of radio amateurs. Modes of operation are USB, LSB, CW, AM and FSK. Providing full coverage of the amateur bands from 160 to 10 metres and including a general coverage receiver tuning from 150 kHz to 30 MHz, the TRIO TS930S is the ideal rig for today's crowded bands.



TS930S . . . £1595.00 inc vat, carriage £7.00

TS440S HF transceiver with general coverage receiver

A step forward in compact HF equipment, the TS440S covers the amateur bands from 160 to 10 metres and is also a general coverage receiver tuning from 100 kHz to 30 MHz. It has keyboard frequency entry, full and semi break-in on CW, one hundred memories and provision for fitting an internal ATU. Modes of operation are USB, LSB, AM, FM and AFSK.



TS440S . . . £998.00 inc vat, carriage £7.00

TS430S HF transceiver with general coverage receiver

A compact HF transceiver suitable for mobile or portable operation, yet having all the facilities necessary for effective radio communication. The TS430S covers the amateur bands from 160 to 10 metres and is a general coverage receiver tuning from 100 kHz to 30 MHz. Modes of operation are USB, LSB, CW, AM with FM optional.

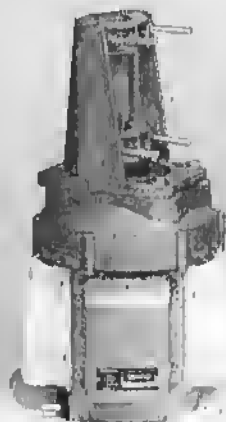


TS430S . . . £857.68 inc vat, carriage £7.00



send £1 for complete mail order catalogue.

DAIWA rotators



The new range of rotators from DAIWA, the MR series, are designed so that additional motors can be added around a central core, each motor increasing the rotators turn and braking capacity. The MR series will accept up to four motors being initially supplied with one. As the number and size of aerials increases, additional motors can be added, and both turning capacity and braking effort increased.



MR750E Multitorque rotator (round controller)..... £254.07 inc VAT,
MR750P as above but with preset controller..... £230.32 inc VAT,
MR300E Higher speed version with round controller.. £255.61 inc VAT,
LMC lower mast clamp..... £17.81 inc VAT,
MR750U additional motor for MR750E/PE..... £82.17 inc VAT,
MR300U additional motor for MR300E..... £82.17 inc VAT,

Carriage on rotators £7.00, components £3.00

DAIWA meters.

CN410M... 3.5 to 150 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors... £61.72 inc vat, carriage £1.50.

CN460M... 140 to 450 MHz, forward 15/150 W, reflected 5/50 W, SO239 connectors... £65.40 inc vat, carriage £1.50.

NS448 with remote head... 900 to 1300 MHz, forward 5/60 W, reflected 1.6/6.6 W, N type connections... £86.60 inc vat, carriage £2.50.

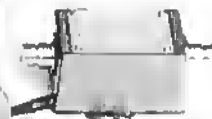
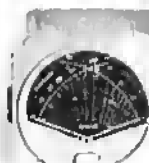
NS660P with switchable meter ranging (average, normal PEP and hold PEP) and provision for optional remote head (U66V), 1.8 to 150 MHz, forward 15/150/1500 W, SO239 connectors... £115.00 inc vat, carriage £2.50.

U66V remote head, 140/525 MHz, max 300 W, N type connectors... £55.27 inc vat, carriage £1.50.

SC20 extension cable for U66V, approx 20 metres long... £29.21 inc VAT, carriage £1.50.

CN410M

NS660P



NS448

CN460M

data communications equipment.

CD600... RTTY, CW, ASCII, TOR, AMTOR decoder, output for UHF television, monitor and printer, can also be used as Morse Intol... £215.14 inc vat, carriage £7.00.

CD670... A higher specification RTTY, CW, ASCII, TOR, AMTOR decoder complete with liquid crystal dot matrix display, variable RTTY shift, normal/reverse mode switch, output for TV, monitor and printer and can also be used as Morse Intol... £327.77 inc vat, carriage £7.00.

CD660... Similar to the CD670 but without the built-in display... £264.97 inc vat, carriage £7.00.



AR2002 interface.

AR2002

RC PACK



Now available for the AR2002 is an RS232 interface (RC PACK) which consists of an 8 bit CPU with its own ROM and RAM.

Designed to be connected directly to the AR2002 or with an additional adapter to the AR 2001, the RC PACK gives two methods of controlling the receiver.

Using the internal software and with your own computer acting as a dumb terminal, the RC PACK provides 50 memory channels, 10 search bands, selectable up/down steps and adjustable delay times etc. You can also assign station descriptions to each listed memory.

If you wish to write your own programs using the RC PACK as an interface then "the sky's the limit".

For those who own a BBC computer we have designed an additional control system which is available in ROM.

The RS232 settings of the interface are 8 bit, no parity, 1 stop bit and either 2400, 4800 or 9600 baud (internally switchable).

AR2002... £487.30 inc VAT carriage £7.00

RC Pack... £255.83 inc VAT carriage £7.00

APROM (BBC)... £10.06 inc VAT carriage £1.00

LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

752



send £1 for complete mail order catalogue.

RADIO COMMUNICATION November 1986

NEW from the Japan Radio Company, the **NRD525**



The enthusiastic short wave listener knows all too well the excellent performance of the NRDS05 and NRDS15 general coverage receivers from the JAPAN RADIO COMPANY. Building on the experience gained from the production of these outstanding receivers, JRC introduce a new model, the NRD525, combining advanced performance with the best class construction of the NRDS05.

The NRD525 is a double superheterodyne receiver having a final IF of 70,453.99/70,453.99MHz and a second of 455kHz. The receiver covers frequencies from 90kHz to 34MHz. An optional internally fitted converter (CMK165) will be available adding the following frequency ranges, 34 to 60MHz, 11.4 to 174MHz and 423 to 456MHz. Modes of operation for the JRC NRD525 are USB, LSB, CW, AM, FM and RTTY. An optional RTTY demodulator (CMH530) will be available enabling a printer to be directly connected to the receiver. The receiver also has a squelch control which operates on all modes.

The NRD525 has been designed to perform when conditions for reception are far from perfect. To help copy weak signals on a crowded band both notch filter and pass band tuning controls are included. The receiver has, as standard, a 3kHz filter for USB and LSB (INTER), a 6kHz filter for AM (WIDE) and in the AUX position on a bandwidth of 12kHz. If an optional filter is placed in the AUX position the 12kHz bandwidth ceases to be available. For CW and RTTY reception the NARR position can be fitted with the optional 500kHz filter (CFL232). In the FM mode (narrow band FM), BANDWIDTH and AGC switches do not function.

The NRD525 is extremely "user friendly" having an easy to use numeric keypad for frequency entry and memory selection. Whether you are entering a full shortwave frequency, Vatican Radio on 6185kHz, or the three digits of Radio Czechoslovakia's long wave transmission on 272kHz, entry is simple, key in the digits as read and press enter. A megahertz only frequency can also be easily entered into the NRD525, simply key in the required number, eg 6 and press the button marked MHz. Switch pads select mode and bandwidth whilst a large heavy knob makes fine tuning a pleasure. A quick tune up or down the band is easily achieved using the up/down pads conveniently located above the tuning knob.

Memory capacity is 200 channels. As well as frequency, each memory holds mode, bandwidth, AGC setting (slow, fast and off) and whether or not the attenuator (approx 20dB) is on or off. Frequencies can be easily transferred from memory to VFO.

The NRD525 has both memory scan and frequency sweep. The receiver can be quickly programmed with the START and END memory channel numbers. Pressing the run button initiates memory channel scan. Operation of frequency sweep is similar, START and END frequencies being entered before commencing sweep.

By pressing numeric key 4, the input RF filters are bypassed or inserted in circuit. An excellent feature when receiving very weak signals. When bypassed the display indicates PASS.

The NRD525 will operate from either 100/120/220/240 volts AC (selectable on back panel) or 1.8 volts DC so making it suitable for use at home or, when out, portable. Add to the above an audio tone control, a tunable BFO for enhanced CW operation, an adjustable level noise blanker, a dimmer switch for the fluorescent display, the ability to connect a high or low impedance aerial and switch between the two, a mini jack socket for use with a separate transmitter and the result is the NRD525 from the JAPAN RADIO COMPANY, a first class receiver purpose built for the dedicated short wave listener.

HK704

KEYS & keyers.

HK708

HK702

TX3

EK150

DK210

MK1024

BST1

BY2

TX3. Morse practice oscillator.
£19.85 inc VAT, call. £1.50
HK708. Straight key.
£21.82 inc VAT, call. £2.50
HK702. Deluxe version on marble base.
£43.90 inc VAT, call. £3.00
HK704. Squeeze paddle.
£20.25 inc VAT, call. £1.50
EK150. Electronic keyer with built-in
aid tone. Solid state or relay keying.
£130.75 inc VAT, call. £3.00
MK1024. Electronic keyer with 1024 bit
memory.
£241.99 inc VAT, call. £3.00
DK210. DAIWA electronic keyer. Re-
quires paddle.
£73.96 inc VAT, call. £2.50

BENCHER Iambic Paddles.
BY1 Black base, £67.42. BY2 Chrome base, £76.97
BY3 Gold plated base, £141.75. VAT inc.
BENCHER Single Paddle.
BST1 Black base, £67.42. BST2 Chrome base,
£76.97. VAT inc.
Carriage on BY & BST series, £3.00

LOWE SHOPS

In Glasgow,
the shop manager is Sim, GM3SAN,
the address, 4/5 Queen Margaret Road, off Queen Margaret Drive,
Glasgow, 041-945 2626

In the North East,
the shop manager is Hank, G3ASM,
the address, 56 North Road, Darlington, 0325 486121.

In Cambridge,
the shop manager is Tony, G4NBS,
the address, 162 High Street, Chesterton, Cambridge, 0223 311230.

In Cardiff,
the shop manager is Carl, GW0CAB,
the address, c/o South Wales Carrels, Clifton Street, Cardiff, 0222 464154.

In London,
the shop manager is Andy, G4DHO,
the address, 223/225 Field End Road, Eastcote, Middlessex, 01-429 3256.

In Bournemouth,
the shop manager is Colin, G3XAS,
the address, 27 Gillem Road, Northbourne, Bournemouth, 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G31YG. His address is Abbotsey, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

LOWE ELECTRONICS SHOPS are open from 9.00am to 5.30pm Tuesday to Friday and from 9.00am to 5.00pm on Saturday. Shop lunch hours vary and are timed to suit local needs. For exact details, please telephone the shop manager.

LOWE ELECTRONICS LTD.

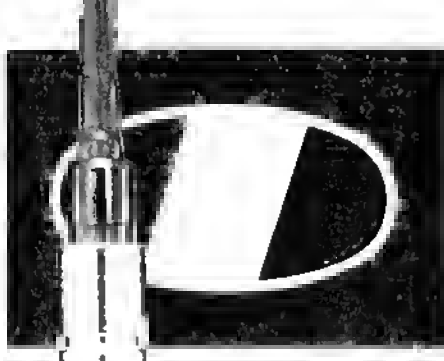
Chesterfield Road, Matlock, Derbyshire DE4 5LE

Telephone 0629 2817, 2430, 4057, 4995.

RADIO COMMUNICATION November 1986

send £1 for complete mail order catalogue.





ICOM

2 NEW Exciting ICOM to give you that movi

NEW! IC-12E, 1200MHz FM Handportable.

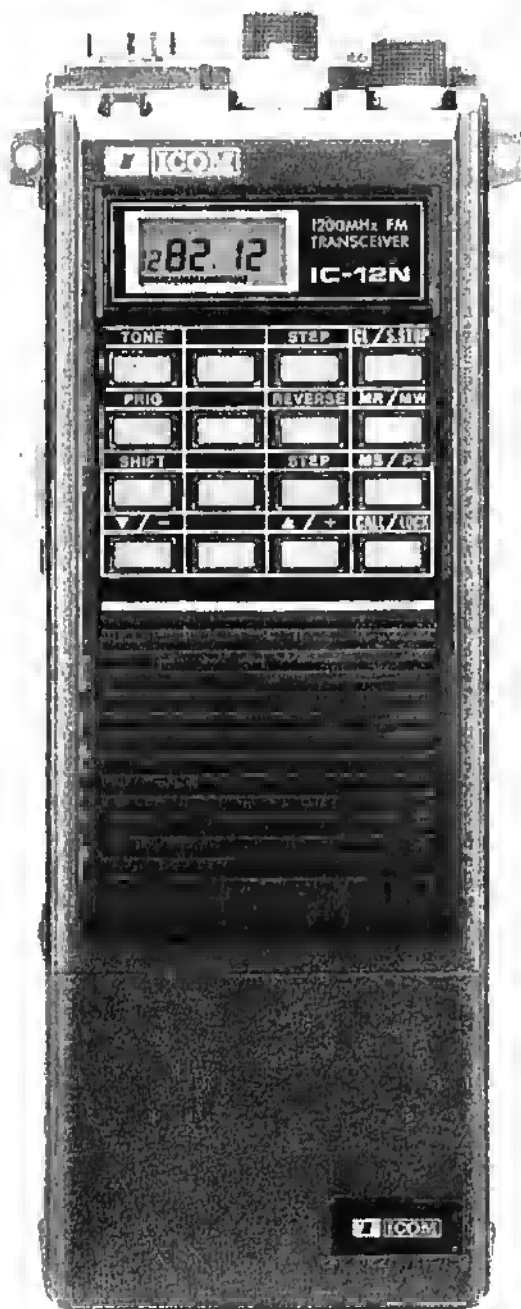
ICOM technology is on the move again, continuing to explore the Amateur Radio field, as a result ICOM present the IC-12E, 23cm. Amateur band, handheld transceiver.

The IC-12E has a 16 button keypad allowing direct access to frequencies, memories and scanning facilities. Ten memory channels store operating frequency as well as simplex/duplex and duplex offset frequency. A priority function allows another frequency such as a repeater or calling frequency to be monitored for activity. The memory scan function continuously scans all ten memories in sequence whilst a programmed scan searches between two limits.

The IC-12E is equipped with a 1750Hz tone generator for initial access to a repeater. Frequency coverage 1260-1299.9875Mhz with 5 frequency step rates. An internal power module provides 1 watt or LOW 100mw. as standard. This handheld is supplied complete with an IC-BP3 nicad battery pack, flexible antenna, A.C. wall charger, belt clip, wrist strap, personal earpiece and full operating instructions.

Also available for the IC-12E and other ICOM Hand-portables are a large range of optional extras including a variety of rechargeable nicad power packs, dry cell battery pack, desk charger, headset and boom mic, speaker mic, leatherette cases and mobile mounting brackets.

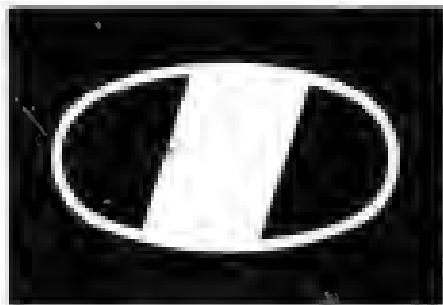
For more information on this handportable and other ICOM Amateur Equipment contact your local ICOM dealer or Thanet Electronics Limited.



British
TELECOM
Registered User For
Mobile Phone Use



Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM



ICOM

Handportable Transceivers ing experience.

NEW! IC-MICRO TWO, Mini-handportable.

This is the smallest handportable transceiver from ICOM. The MICRO-TWO, 2 metre FM measures only 148 x 61 x 31mm. with BP22 battery pack (not shown here). The MICRO-TWO is a hand-size transceiver which will equally fit most pockets.

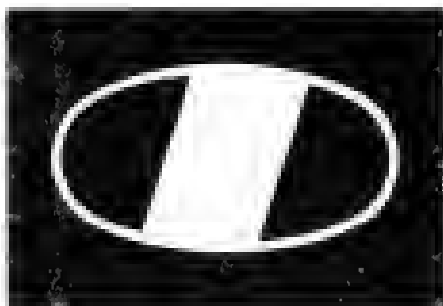
On the top panel a clear LCD readout gives frequency and memory channel number. Tuning is made easy using up/down toggle switches to select 1MHz, 100kHz or 12.5kHz steps as well as the 10 memory channels. Full repeater and reverse duplex operation facilities are featured including repeater access tone. An automatic power saving function reduces battery power consumption when in receive mode. Output power is 1 watt or 100 milliwatts (low) with the BP22 nicad pack.

The ICOM MICRO-TWO is the ultimate in 2 metre miniature handheld transceivers, yet despite it's small size the receiver sensitivity and performance has not been compromised. This handy transceiver comes complete with the BP22 nicad pack (not shown here), A.C. wall charger, helical antenna. Most existing ICOM accessories can also be used.

An optional extra, the BC50 desk charger will rapidly charge the BP22 battery in just one hour. Other options include the BP23 long-life, low-power and BP24 medium-life, high-power nicad battery packs. Contact us or your local ICOM dealer for more details on this exciting new product.

Actual Size Photograph.
This shows the non-standard low capacity battery pack. N.B. Standard battery pack is normally the higher capacity BP22 as mentioned in text.





ICOM

IC-3200E, Dual-band transceiver.



If you are a newly licensed or just undecided about which band to first operate, then the ICOM IC-3200E is just the answer. This is a dual-band (144-146/430-440MHz) F.M. transceiver ideally suited for the mobile operator. The IC-3200E has a built in duplexer and can operate on one antenna for both VHF and UHF, and with 25 watts of

output power on both bands (the low power can be adjusted from 1 to 10 watts) you can never be far from a contact whether simplex or 2m/70cm repeater.

The IC-3200E employs a function key for low priority operations to simplify the front panel and a new LCD display which is easy to read in bright sunlight. 10 memory channels will show operating frequencies simplex or duplex, and four scanning systems memory, band, program and priority scan.

NEW! IC-48E, 70cm. FM Mini-mobile.

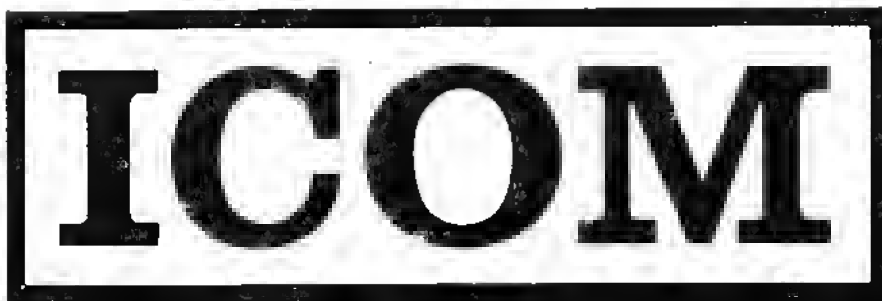
This NEW 70cm. band transceiver is so small that it will fit almost anywhere in your vehicle or shack. Power output is 25 watts or 5 watts low, the IC-48E is supplied complete with an internal loud-speaker. The large front panel LCD readout is designed for wide-angle viewing with an automatic dimmer circuit to control the back lighting of the display for day or night operating. The front panel of the IC-48E is straightforward to make mobile operation safe and easy. The IC-48E contains 21 memory channels with duplex and memory skip functions. All memories and frequencies can be scanned by using the HM15 hand mic provided.

IC-48E options include the PS45 13.8V. 8 amp power supply, SP8 and SP10 external loudspeakers, HS15/SB mobile flexible microphone and PTT switchbox.

Why not try 70 cms as a serious alternative to the 2 metre band, you might be amazed at what can be achieved. For more information contact us or your local ICOM dealer.



Thanet ICOM **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM** **Thanet ICOM**



ICOM Models currently available.

H.F.

IC 751A SSB,CW,I'M,AM,RTTY, Gen.Cov.Rx. 32 mems 100W
 IC 745 SSB,CW,AM (Rx only), I'M (optional) RTTY
 Gen.Cov.Rx. 16 mems 100W
 IC 735 SSB,CW,AM,I'M Gen.Cov.Rx. 12 mems 100W
 IC 2K1 1KW PEP Linear Auto Band Switching
 IC 2K1PS A.C. Power Supply for IC 2K1
 IC AT100 Auto Antenna Tuner 100W (751A,745)
 IC AT150 Auto Antenna Tuner 100W (735)
 IC AT500 Auto Antenna Tuner 500W (2K1)
 IC AH2A Mobile Auto Antenna Tuner
 IC AH2B Antenna Whip and Mount for AH2A

RECEIVERS

IC R711 0.1-30MHz All Mode Keypad Entry 32 memories
 IC R7000 25 1000 + 1025-2000MHz (spec to 1300MHz)
 Keypad Entry 99 memories

50MHz

IC 505 SSB,CW I'M (optional) Portable 3/10W
 IC 551 SSB,CW,I'M (optional) Base Station 10W
 IC 551D SSB,CW I'M (optional) Base Station 80W

2M

IC 2E I'M Handportable Thumbwheel Entry 1.5W/BP3

IC 02E FM Handportable Keypad Entry 3W BP3
 IC 271 I'M Mobile Scanning 5 mems 25W
 IC 27H I'M Mobile As Above 45W
 IC 281 I'M Mobile 21 mems 25W
 IC 2811 I'M Mobile As Above 45W
 IC 2901 Multimode Mobile Scanning 5 mems 25W
 IC 271 Multimode Base Station 32 mems 10W
 IC 2711 Multimode Base Station As Above 25W
 IC 27111 Multimode Base Station As Above 100W

70CM

IC 4E FM Handportable Thumbwheel Entry 1.5W/BP3
 IC 04E I'M Handportable Keypad Entry 3W BP3
 IC 47E FM Mobile Scanning 9 mems 25W
 IC 490E Multimode Mobile Scanning 5 mems 10W
 IC 471E Multimode Base Station 32 mems 25W
 IC 471H Multimode Base Station As Above 75W

2m & 70CM

IC 3200E FM Mobile Scanning 10 mems 25W

23CM

IC 12E FM Handportable Keypad Entry 1250-1300MHz
 1W BP3
 IC 120 FM Mobile Scanning 6 mems 1W
 IC 1271E Multimode Base Station 1240-1300MHz 10W

Authorised ICOM Dealers.

Alytronic, Newcastle 091 2761002
 A R F Communications Ltd, Merseyside 09252 29881
 Anconnet ARE, London 01 992 5765
 Amateur Electronics, Birmingham 021 327 1457
 Arrow Electronics Ltd, Chelmsford, Essex 0245 381673
 Besante, Cardiff 0222 486884
 Booth Holdings (Bath) Ltd, Bristol 02217 2402
 Bradhurst Electronics Ltd, W. Sussex 0494 400786
 D P Hobbs, Norwich 0603 615786
 Dressler (UK) Ltd, Leyton, London 01 558 0854
 D W Electronics, Widnes, Cheshire 051 420 2559
 Eastern Communications, Norwich 0603 667189

Hobbytronics, Runcorn, Cheshire 0565 4040
 Poole Logic Poole, Dorset 0202 683093
 Photo Acoustics Ltd, Buckinghamshire 0908 610625
 Ridcomm Electronics, Co. Cork, Ireland 010 3521 632725
 Radio Shack Ltd, London 01 624 7174
 R A S Nottingham 0602 280267
 Ray Withers Comins, Weyley, W. Midlands 021 421 8201
 Scotcomms, Edinburgh 031 657 2430
 South Midlands Communications & Branches 0703 867333
 Tyrone Amateur Electronics, Co. Tyrone, N. Ireland 0662 42043
 Reg Ward & Co Ltd, Axminster 0297 34918
 Waters & Stanton Electronics, Hockley, Essex 0702 206835

Telephone us free-of-charge on:

HELPLINE 0800-521145.

— Mon-Fri 09.00-13.00 and 14.00-17.30 —

This is strictly a helpline for obtaining information about or ordering ICOM equipment. We regret
 this service cannot be used by dealers or for repair enquiries and parts orders. Thank you

You can get what you want just by picking up the telephone. Our mail order department offers you free same day despatch whenever possible, instant credit, interest free H.P., Barclaycard and Access facility, 24 hour answerphone service



Thanet Electronics
 Sea Street, Herne Bay, Kent CT16 8LD
 Tel: (0227) 363859
 Dept. RC

Now from **AMCOMM - ARE** Carriage Free Nationwide Mail Order...

UHF MOBILE

YAESU FT 770RH 70cm 25w FM high visibility display	495.00
YAESU FT 790R 70cms all mode	399.00
YAESU FT 2700RH 70cm/2m 25w each band full duplex	399.00
YAESU FT 2700RH 70cm/2m 25w each band 10w/1w	617.00
ICOM IC 490E all mode 70cms 10w/1w	556.00
ICOM 3200E 2m/70cm 25w each band	495.00
ICOM IC 47E 25w FM very small 9 memories	



NEW

HF EQUIPMENT

YAESU FT 767 1.8MHz-430MHz. All mode gen cov rcvr	POA
YAESU FT ONE gen cov tcvr	POA
YAESU FT 980 gen cov tcvr inc AM/FM	1750.00
YAESU FT 757GX gen cov tcvr inc AM/FM/Keyer	949.00
YAESU FT 757GX gen cov tcvr inc AM/FM/Keyer	1465.00
ICOM IC 751A gen cov tcvr inc AM/FM/Keyer	925.00
ICOM IC 745 gen cov tcvr	929.00
ICOM IC 735 gen cov tcvr inc AM/FM	



HF LINEAR AMPLIFIERS

YAESU FL 2100Z 160m to 10m	899.00
YAESU FL 7000 solid state integral PSU and ATU	1590.00
TOKYO HL 1K 1kw amplifier	POA
TOKYO HL 1KGX new 1K linear	POA
TOKYO HL 2K new 2K linear	POA
TOKYO HL 3K 3Kw new linear	POA
ICOM IC 2KULPS	1646.00

HANDHELD TRANSCEIVERS

FT 727 VHF UHF Hand held	425.00
YAESU FT 203R with FBA 5 battery case	225.00
YAESU FT 203R with FNB 3 nicad 2.7w	255.00
YAESU FT 203R with FNB 4 nicad 3.7w out	259.00
YAESU FT 203R with FBA 5 battery case 1.8w	269.00
YAESU FT 209R with FNB 3 nicad 2.7w	299.00
YAESU FT 209R with FNB 4 nicad 3.7w	305.00
YAESU FT 209R with FBA 5 battery case	275.00
YAESU FT 209RH with FNB 3 nicad 3.7w	309.00
YAESU FT 209RH with FNB 4 nicad 5w	315.00
YAESU FT 209RH with FBA 5 battery case	225.00
YAESU FT 209RH with FNB 3 nicad 3.7w	289.00
YAESU FT 209RH with FNB 4 nicad 5w	275.00
ICOM IC 2E synthesised 1.5w 2m	289.00
ICOM IC 02E keypad entry lcd display	
ICOM IC 4E synthesised 1.5w 70cm	
ICOM IC 04E keypad entry lcd display 70cms	

CASH IN NOW, ON OUR HUGE BUYING POWER! ENORMOUS STOCKS WHERE A GOOD DEAL MORE COSTS A GOOD DEAL LESS!

AMCOMM - ARE

373 Uxbridge Road, London W3 9RN, Tel: 01-992 5765. Telex: 334312.
Showroom and Shop opening hours 9.30-5.00pm — Closed Mondays

RECEIVERS

YAESU FRG 8800 gen cov 150Khz-30Mhz large display, keyboard entry/free tuning	604.00
ICOM IC R71 100 Hz to 30Mhz passband tuning/notch filter, variable tuning rate	789.00
YAESU FRV 8800 converter module 118-179 for FRG 8800 range extension	100.00
AOR 2002 UHF/VHF 25Mhz-550Mhz and 800Mhz-1300Mhz	465.00
YAESU FRG 9600 UHF/VHF Scanning receiver all mode 100 mem. Now up to 950MHz	499.00
ICOM R7000 Scanning rcvr 25-2000Mhz 99 memories all mode	919.00
FDK ATC 720 airband rcvr handheld 720 channels	189.00
FOK RX 40141 180Mhz handheld rcvr	159.00
JIL SX 400 UHF/VHF rcvr inc PSU	598.00

RTTY/CW

TONO 5000E CW RTTY ASCII and AMTOR c/w 5" high res monitor	POA
--	-----

VHF MOBILE TRANSCEIVERS

Range of 50Mhz equipment both YAESU and ICOM in stock.	
YAESU FT 290R mob/port 2m all mode c/w nicads, chgr, case	POA
YAESU FT 290R as above with Mutek	POA
YAESU FT 270R 25w FM	379.00
YAESU FT 270RH 45w FM with fan	445.00
YAESU FT 2700RH 2m/70cms 25w each band full duplex	399.00
ICOM IC 290D 25w all mode	515.00
ICOM IC 27E 25w FM 9 mem	379.00
ICOM IC 27H 45w FM 9 mem	419.00
FOK M750XX 2m all mode 20w	449.00
FDK M725X 2m FM 25w	279.00

VHF BASE STATIONS

YAESU FT 266R/2M all 726 options available	949.00
ICOM 271E multi mode 25w 32 mem	799.00
ICOM IC 271E/H multi mode 100w	979.00

UHF BASE STATIONS

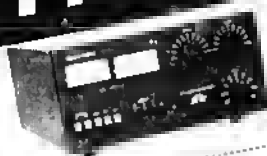
YAESU FT 726 70cms multimode — all 726 options	949.00
ICOM 471 E 25w multimode 70cms	889.00
ICOM 471 H high power multimode (75w) — 70cms	1099.00
ICOM 1271 E multimode 1240-1300Mhz	1099.00

Plus a full range of MARINE/PMR Communication Equipment.
Carriage Free Nationwide Mail Order...
SUPER H.P. TERMS AND TRADE-IN SERVICE



Now from AMCOMM - ARE Carriage Free Nationwide Mail Order...

VHF LINEAR AMPLIFIERS



TOKYO

HL160V 2m 10w in 160w out	250.95
HL82V 2m 10w in nom 85w, typ 100w out	145.95
HL110V 2m 10w in 110w out	250.95
HL 35 2m Gaasfet preamp 5.5w in 35w out	86.25
HL 30V 2m 5.3w in 30w out	56.70
HL 20U 70cms 5.3w in 20w out	89.25
HL 30U 70cms Gaasfet preamp 2w in 30w out	126.00
HL 60U 70cms Gaasfet preamp 1.5w in 60w out	225.75
HL120U 70cms Gaasfet preamp 12w in 100w out	418.95
HRA 2 2m mast preamp, Gaasfet	105.00
HRA 7 70cms mast preamp, Gaasfet	105.00

BNOS

LPM 144-1-100 2m c/w preamp 1w for 100w out	197.50
LPM 144-10-100 2m c/w preamp 10w for 100w out	175.00
LPM 144-3-100 2m c/w preamp 3w for 100w out	197.50
LPM 144-25-160 2m c/w preamp 25w for 160w out	250.00
LPM 144-3-180 2m c/w preamp 3w for 180w out	290.00
LPM 144-10-180 2m c/w preamp 10w for 180w out	125.00
LPM 144-3-50 2m c/w preamp 3w for 50w out	125.00
LP 144-10-50 2m c/w preamp 10w for 50w out	230.00
LP 144-3-50 2m c/w preamp 3w for 50w out	235.00
LPM 432-1-50 70cm c/w preamp 1w for 50w out	195.00
LPM 432-3-50 70cm c/w preamp 3w for 50w out	329.00
LPM 432-10-50 70cm c/w preamp 10w for 50w out	
LPM 432-10-100 70cm c/w preamp 10w for 100w out	

MICROWAVE MODULES range also available, call for details or literature on above.



ANTENNA COUPLERS

AMCOMM 9000 coax, random wire, tuned feeders 100w	89.00
CAPCO SPC 300C 1Kw antenna coupler	188.37
CAPCO SPC 3000C 3Kw antenna coupler	279.42
CAPCO SPC 300M 1Kw module only	103.09
CAPCO SPC 3000M 3Kw module only	132.18
CAPCO SPC 3000M 3Kw with SWR/power meter	115.00
TOKYO HC 200 8 band 200w pep with SWR/power meter	199.00
TOKYO HC 400 9 band 350w pep with SWR/power meter	399.00
TOKYO HC 2000 9 band 2Kw pep	85.00
WELZ AC 38 3.5-30Mhz 200w	345.00
ICOM AT 100 100w auto antenna coupler	485.00
ICOM AT 500 500w auto antenna coupler	339.00
YAESU FC 757GX receiver antenna coupler	59.00
YAESU FRT 7700 receiver antenna tuner	

HEIL ACCESSORIES

HEIL HC3 Mic element Yaesu/Trio	22.85
HEIL HC5 Mic element Icom SM5/6	25.40
HEIL HM5 Desk Mic (300Hz-3KHz) cardioid	65.00
HEIL MM5 handheld Mic with HC3	29.00
HEIL SS2 Speaker special comms spkr	59.00
HEIL BM10 lightweight headset/boom mic	65.00

POWER SUPPLIES

YAESU FP 757HD 20A	239.00
YAESU FP 757 GX 20A	169.00
YAESU FP 700 20A	195.00
BNOS 12/6amp	69.00
BNOS 12/12amp	115.00
BNOS 12/25amp	169.00
BNOS 12/40amp	340.00
BNOS professional range also available on request	POA
ICOM ICPS 35 switch mode	193.00
ICOM PS 15 20amp external	158.00
ICOM ICPS 55 20amp	185.00
ICOM IC2 KLPS to match IC2KL linear	429.00
ICOM ICPS 25 switch mode	112.00
SMC RS 12 4amp 5 amp peak	14.95
DRAE 4 amp	40.50
DRAE 6 amp	63.00
DRAE 12 amp	86.50
DRAE 24 amp	125.00

HI-MOUND MORSE KEYS

HK 702 manual with marble base	42.50
HK 704 manual	28.50
HK 705 manual	22.50
HK 706 manual	23.00
HK 707 manual	22.25
HK 708 manual	21.50
HK 802 manual solid brass	99.00
HK 803 manual solid brass	99.00
MK 701 single lever paddle	20.00
MK 702 single lever paddle	29.95
MK 703 twin paddle squeeze heavy base	37.15
MK 705 twin paddle squeeze marble base	32.20
KENPRO KP 100 squeeze paddle/Cmos keyer	89.00
230v/13.8v	
KENPRO KP 200 squeeze paddle/keyer multi memory	179.00
4096 bit	

FIND OUT WHY WE'RE FAST GAINING A REPUTATION FOR FIRST CLASS VALUE & TOP QUALITY SERVICE...

Where service and courtesy comes naturally...
373 Uxbridge Road, London W3 9RN, Tel: 01-992 5765

Telex: 334312.

AMCOMM - ARE ORDER FORM

Please supply:

by ☐ Cheque ☐ Barclaycard (Number

Name

Address

Tel

RC11 86

I enclose payment for: £

☐ Access (Number

Call Sign

ICS

● **FIRST IN AMTOR!** ● **FIRST**



PK-232

The World's first 5 mode terminal unit!

Now, PACKET, AMTOR, RTTY, CW, ASCII transceive in one compact, intelligent terminal unit. Works with any computer equipped with an RS232 interface. Incorporates a no compromise HF modem, with an 8 pole bandpass filter followed by a limiter/discriminator with auto threshold correction. The correct bandwidth is automatically chosen for the mode selected. A front panel switch allows selection between two transceivers. No more switching cables when moving from HF to VHF. All code conversion is taken care of by the internal Z-80A processor. Built-in tuning indicator. 12 volt D.C. power requirement. User friendly application programs/interface cables available for many popular personal computers.

ALL YOU WILL EVER NEED FOR AMATEUR DATA COMMUNICATION!
PK-232 ONLY £269.95 inc VAT (£3.50 p&p)



AMT-2

Europe's most popular AMTOR terminal unit!

AMTOR, RTTY, CW transceive with any computer having an RS232 interface. Thousands already sold. In use worldwide in many commercial applications including Red Cross, oil rigs, etc. Built-in tuning indicator 12v D.C. power requirement. Wide range of split screen application programs—available for most popular personal computers.

AMT-2 ONLY £245.00 inc VAT (£2.50 p&p)
Our range of application programs is too long to list here—call with your requirements.



ALM 203/E



ELH-24B Amplifier

Unbeatable value in 2 metre hand held transceivers!

A fully programmable 3 watts output 2 metre FM transceiver. Marine band RX coverage, and a FREE 30 WATT AMPLIFIER/ GaAs FET PRE-AMPLIFIER. LCD display. 16 key control panel. 10 memory channels. Antenna. Belt clip. Carrying strap. NI-CAD BATTERY PACK INCLUDED. Optional range of accessories, including leatherette case; speaker/microphone; mobile charger mount etc. etc. The value for money is just unbeatable, as hundreds of satisfied U.K. users will testify!

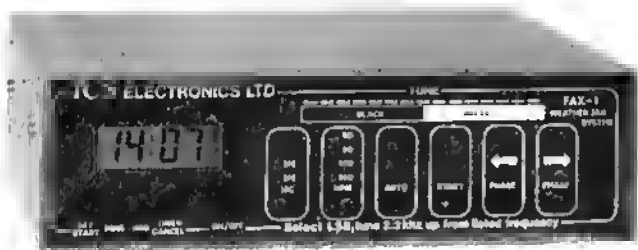
ALM-203E £249.95 (£4.00 p&p)
ALR-206E £249.95 (£2.50 p&p)
(25 watt 2 metre mobile with similar features to above)

T IN PACKET!

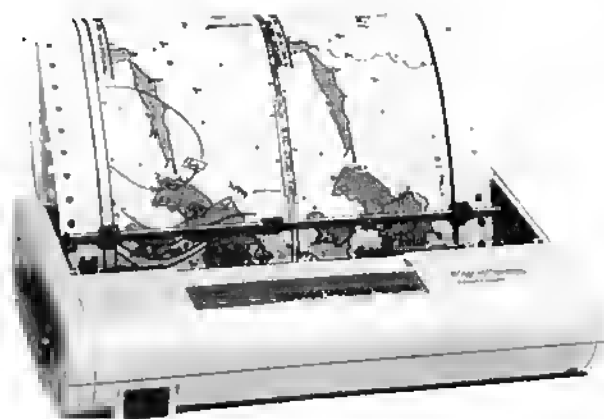
● NOW FIRST IN FAX!

LOW PRICES

ICS



FAX-1



FAX-1a Printer

New H.F. Fax Receiver price breakthrough!

U.K. designed and produced, you can now obtain weather maps, press photographs and satellite cloud cover detail on any Epson FX-80 compatible computer printer with amazing clarity. Do not confuse with other products offering only a low resolution screen display. They do not even come close to the FAX-1 in image clarity. Built-in tuning indicator. All standard R.P.M. and I.O.C. rates. Fully automatic operation (including START; RPM, IOC selection). 1:1 picture aspect ratio. 12v D.C. power requirement. Built-in tuning indicator. Built-in clock and timer. Battery powered compatible printer available for Marine, mobile applications. Needs only audio from an HF receiver and a suitable printer to operate. PRINT QUALITY COMPARABLE TO PROFESSIONAL UNITS AT ONE FIFTH THE PRICE! Send for details and print sample.

FAX-1 ONLY £269.95 inc VAT (£3.50 p&p)

FAX-1A (portable printer) £425.00 inc VAT (£4.50 p&p)

**Manufacturers and U.K. Main Importers for A.E.A. and ALINCO.
12 Months Parts and Labour Warranty on all products sold**

*Send large SAE for further details. Visitors by appointment only.
Prices may vary according to prevailing exchange rates.*

ICS ELECTRONICS LTD

P.O. Box 2, Arundel
West Sussex BN18 0NX
Telephone: (024 365) 590



* FREE FINANCE *

SMC'S NAME IS MENTIONED



YAESU FROM S.M.C. THE BEST GUARANTEE MONEY CAN BUY FT23-FT73



Hear the difference for yourself—YAESU's baby giants out perform all the others! Small—Perfectly formed—Outstanding performance—A nice little handfull That's Yaesu—That's the FT23 and his 70cm brother FT73.
YAESU and S.M.C. together combine to bring you the latest family—Technology and knowhow from YAESU—Expert sales advice and 1st class service back-up from S.M.C. PLUS our FREE finance—FREE delivery—FREE 2 year guarantee.
Unbeatable FT23 on 2 metres AND FT73 on 70cm
No prices given—We'll match the best price in the U.K. Phone today for yours.

FT23R

- * 144-146MHz
- * Professional approach
- * Solid die cast chassis
- * Gasket Sealed against weather
- * Up to 5W output
- * Ten memory channels—with Rptr shift
- * Busy/Priority channel scanning
- * Bargraph S/PO meter
- * LCD 6 digit display
- * Nicad or dry cell operation
- * Top panel VFO knob

FT73R

- * 430-440MHz
- * Up to 5W output
- * Solid die cast chassis
- * Weather proof seals
- * Ten memories inc rpt shift
- * Single knob VFO or scanning
- * Non standard rpt shift programme
- * Busy/Priority channel scanning
- * 3 Nicad battery options
- * 2 dry cell options
- * Tough polycarbonate battery case

WE'LL MATCH THE BEST UK PRICE

THIS IS THE ONE

The U.K.'s most popular 2M portable base station has been improved. Yes, Really! YAESU have done the IMPOSSIBLE.

The new Mark II version of YAESU's famous multi-mode has push button control, scanning speaker/Mic, full 144-146 MHz coverage, SSB (lower or upper), FM and CW. Options include custom Nicad battery pack or 25W linear amp and a host of YAESU accessories.

Brief spec: 2.5W RF output on FM 2 V.F.O.s, Programmable Memory scan or memory channel scan. Noise blanker. FM steps 12.5/25/50 kHz on FM, 25/100/2500 Hz on SSB and CW.

In short—it's a beaut! Call in at your nearest branch and get your hands on this one NOW!



WE'LL MATCH THE BEST UK PRICE

LEEDS
SMC (Leeds)
257 Dilly Road,
Leeds 16, Yorkshire
Leeds (0532) 782325
9.5.30 Mon-Sat

CHESTERFIELD
SMC (Jack Tweedy) Ltd
102 High Street,
New Whittington, Chesterfield
Chesterfield (0246) 453340
9.30-5.30 Tue-Sat

BUCKLEY
SMC (MPI)
Unit 27, Pinfold Lane
Buckley, Cheshire
Buckley (0244) 549563
10.5 Tue, Wed, Fri
10.4 Sat

JERSEY
SMC (Jersey)
1 Belmont Gardens
St Helier, Jersey
Jersey (0534) 77067
9.5.30 Mon-Sat
Closed Wednesday

N. IRELAND
SMC (N Ireland)
10 Ward Avenue
Bangor, Co Down
Bangor (0247) 464875

STOCK CARRYING AGENTS: JOHN DOYLE, TRANSWORLD COMMS, NEATH (0639) 52374 DAY (0639) 2942 EVE
JACK McVICAR, SCOTCOMMS, EDINBURGH 031 657 2430
BERNARD BOOTH, BOOTH HOLDINGS, SALTFOED, BRISTOL (022 17) 2402

S. M. HOUSE, SCHOOL CLOSE, CHANDLERS FORD INDUSTRIAL ESTATE, EASTLEIGH,



South Midlands

RADIO COMMUNICATION November 1986

* 2 YEAR GUARANTEE *

WITH INCREASING FREQUENCY



FT690R II

- ⌘ Full 50MHz band coverage
- ⌘ FM—USB—LSB—CW
- ⌘ 2.5W RF O/P—10W with linear
- ⌘ Channel steps:
 - FM 5/10/20kHz
 - SSB 25/100/2500 Hz
- ⌘ YAESU options include
 - External power supply
 - Flexible boom microphone
 - Telescopic whip antenna
 - 10 Watt linear amp or AC power supply unit
 - Die cast chassis for strength
- ⌘ Dual VFO's—10 memories
- ⌘ Priority channel monitoring on either V.F.O.



£ WE'LL MATCH THE BEST UK PRICE

FT727

- Incredible! That's the only word for the YAESU FT727R. YAESU has combined 2M and 70cm in one neat Multi-function package. Look at these features!
- ⌘ 5 Watts O/P on 2M and 70cm (with FN84A battery).
 - ⌘ All functions displayed on L.C.D. — See at a glance which functions are in use.
 - ⌘ CAT I/P and O/P socket gives S meter read out and accepts input from computer for complete external keypad control.
 - ⌘ Cross-band Semi-duplex operation.
 - ⌘ 10 standard memories.
 - ⌘ Programmable memory scan plus 12.5kHz step selection on VHF and UHF.
 - ⌘ All this in a hand size package 71×201×38mm (with FN84A battery).



£ WE'LL MATCH THE BEST UK PRICE



FRG 9600 MK IV
£525

SUPERB

- Accessories supplied include
Mobile Mounting Bracket—
Telescopic aerial—Wire stand—DC pwr cord.
60-950MHz all mode scanning communications receiver
100 memories—scans memories or pre-set frequency limits
VFO or 10 button keypad input—Keypad selection AM narrow—AM wide—USB
- Super HF/VHF receiver (VHF option)
LCD direct readout with 8 bit
CPU function control. 21 button
keypad entry or V.F.O. frequency

- PA4C 220V-12V DC adaptor £16.50
- SP55 Ext Spkr £18.00
- NTSC Video Unit £15.00

- Up/down scan—Priority—Squelch—Volume—Tone—Computer control port.
- Full gen cov 150kHz—29.999MHz.
AM—FM—LSB—USB—CW—12 memories with back up.
100—120—220—240V—plus 12V DC operation (optional)
Clock and timer On/Off control—Fast/Slow tune dial
Lock—Computer control socket



FRG 8800 TOPS IN HF RX
£ WE'LL MATCH THE BEST UK PRICE

FREE FINANCE . . .

*On many regular priced items SMC offers.
Free Finance (on invoice balances over £120)
20% down and the balance over 6 months or
50% down and the balance over a year
You pay no more than the cash price!
Details of eligible items available on request.

FREE S.M.C. SERVICE INTERLINK DELIVERY / / /

Free interlink delivery on major equipment.
Access Barclaycard over the phone.
Biggest branch agent and dealer network.
Interlink contract rate £7.30 inc.
Biggest stocklist of amateur equipment.
Same day despatch whenever possible.

GUARANTEE

Importer warranty on Yaesu Musen products.
Able staffed and equipped Service Department.
Daily contact with the Yaesu Musen factory.
Tens of thousands of spares and test equipment.
Twenty five years of professional experience.
• 2 years warranty on regular priced Yaesu products

MAIL ORDER open 9.00-5.30 Monday-Friday
SHOWROOM 9.00-1.00 Saturday

SERVICE & SPARES Monday-Friday only

HAMPSHIRE SO5 3BY. TEL: (042 15) 55111.

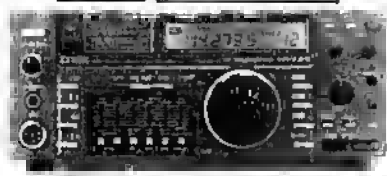
TLX 477351 SMCOMM G
FAX (04215) 63507 SMC FX

Communications Ltd.





JUST BARGAINS



- New ICOM IC735. Ideal for mobile or base use—Measures 9.5 x 9.5 x 3.7 inches
- All HF amateur bands SSB—AM—FM—CW
- Twin VFO's plus 12 memories
- L.C.D. readout—Adjustable power output—Computer control jack—Passband tuning
- Full range of accessories include AT150 Antenna Tuner—PS55 AC power supply
- Supplied with HM12 scanning m/c.
- Superb to use—In stock now at £949.00 inc.



IC75A III Icv	£1405.00
IC745 Icv	£299.00
IC735 III Icv	£948.00
PS35 PSU	£193.00
PS15 PSU	£158.00
PS15 PSU	£185.00
SM6	£39.10
ICR21 Receiver	£825.00
IC7711 2m base	£839.00
IC421E 70cm base	£927.00

OSCAR BASE ANTENNAS

OSCAR Base Antenna	£53.25
OSCAR Base Antenna	£89.05
OSCAR Base Antenna	£46.35
VHF, Discone Rx only 65-520	£22.50
GP23 2m vhf 2.8dBd/4	£64.25
GP14W 2m vhf 6.4dBd/4	£42.00
GPV14W 2m vhf 5.5 6.4dBd/4	£53.15
GPV55 2m vhf 6.4 dBd/4	£45.50
GP2M 2m vhf 6.4 dBd/4	£24.00
GP14W 2m vhf 6.4 dBd/4	£67.93
GP432X 70cm vhf 13.4	£47.50
GP714 70cm vhf 10dBd	£93.95
70cm 2m 70cm 2m 2	£47.00
11570 144/70 duplexer	£24.95
LT606 log 50-500MHz	£184.00

OSCAR MOBILE

370F 4m 20dB/4	£10.30
20W 2m 1/2 1/2	£3.15
2N1 2m 5/8 1/2 3dB/4	£8.94
78F 2m 5/8 1/2 4.5dB	£21.15
78B 2m 5/8 1/2 1/2 1/2	£18.64
7051 2m 7/8 short whip	£21.15
BS1 2m 5/8 1/2	£24.10
258 70cm 3.5dB/4	£29.37
2581 70cm 6dB/4	£32.80
358 70cm 6.3dB/4	£33.23
20N20X 2m 70 2 2 5 1	£37.75
2N6M 50 144	£11.25
225M 25 2m 70cm	£11.33
381 2m mobile ele	£10.47
HS770 144 432 duplex	£24.95
GCCA Gutter 4m cable	£14.25
SOCA 4m cable + PL259	£6.00
SOCA 6m cable + PL259	£7.20
SOCALLR 4m long reach	£8.50
IMCAS trunk mount fm	£12.25
IMCA II 0 trunk mt	£16.10
SOMK magnetic ant 4m	£12.23
SOWM adj wing mount	£6.00
GCD gutter 41 adj	£8.45
BSO bumper strap	£11.50
HSBRK bumper mt ext	£23.35

BASES [RE] WITH ELEMENTS



HENRY RADIO TEMPO 2002A LINEAR AMP

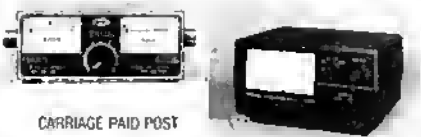
- 1 ONLY
 - 144-146 MHz
 - 1 kW P.E.P.
 - Fully protected circuits
 - 22W I/P-1kW O/P
 - 3CX800A7 CGR Triode
- £1,322.00

POWER METERS HANSEN + S.M.C. IN LINE POWER/SWR BRIDGES P.E.P., AVERAGE 1.8-440MHz

The Hansen range covers 30 quality models with top-of-the-line the FS710 This is a full frequency response, peak envelope power and average in-line wattmeter with many novel features. Notable being the 'power independent' SWR scale - no forward power calibration knob, just direct reading SWR.

Model	Frequency Range	Power Range	Price
FS710V	1.8-60MHz	20-2000W	£107.80
FS60HP	1.8-60MHz	20-2000W	£106.70
FS50VP	50-150MHz	20-200W	£106.70
FS500H	1.8-60MHz	20-2000W	£89.50
FS500V	50-150MHz	20-200W	£89.50
FS300V	50-150MHz	20-200W	£33.50
FS601M	1.8-30MHz	20-200W	£62.13
FS603M	430-440MHz	5-20W	£62.15
FS210	1.8-150MHz	20-200W	£65.50
FS301M	2-30MHz	20-200W	£42.25
FS301MH	2-30MHz	200-2000W	£42.25
FS711I	2-30MHz	20-200W	£43.65
FS711V	50-150MHz	20-200W	£43.65
FS711U	430-440MHz	5-20W	£43.65
FS5E	3.5-150MHz	20-2000W	£42.75
FS5S	1.8-150MHz	20-2000W	£42.75
SWR3E	3.5-150MHz	20-2000W	£38.75
SWR500	3.5-150MHz	1-10W	£38.75
FS20DL	3-150MHz	1-10W	£43.05
FS20D	3-150MHz	5-20W	£43.65

Model	Frequency Range	Power Range	Price
JDI 10	1.5-150MHz	10-100W	£16.50
S3-30L	N/A (CB style)	3-5-170MHz	£9.20
T3-170L	3-5-170MHz	Retaine	£55.00



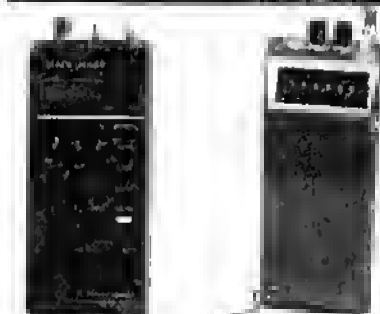
CARRIAGE PAID POST



CAPCO SPC 300D

- British designed and built.
 - Quality components throughout.
 - Continuous tuning 1 to 30MHz.
 - SPC 300D 1kW P.E.P. (300W continuous)
 - SPC 3000D 3kW P.E.P. (1500W continuous)
 - Lighting safety device fitted as standard.
 - 3 aerial sockets.
 - Precise tuning—digital turn counter.
 - Input impedance nominal 50 ohms.
 - Buy CAPCO—Stay in tune with the world
- SPC 300D £225.00 SPC 3000D £325.00

THE SCANNER TWIN



S.M.C. BLACK JAGUAR

- 16 Channel Pocket Scanner
 - Easily fits in pocket
 - Frequency coverage 76-29-995MHz
 - 50-88 MHz
 - 115-178 MHz
 - 200-280 MHz
 - 360-520 MHz
 - Delay and Priority function
 - Scans memories of preset frequency limits
 - P/button input of most commands
 - Easy to use—Handy to have
 - Quality electronics in a quality case
 - 1 N.C. aerial (supplied)
- £269.00 inc

S.M.C. VHF HANDIE

- Quality Item S.M.C. in VHF
 - Covers 141-179-99 MHz (1M)
 - 2.5kHz Channel steps
 - 25kHz filtering (reception of 12.5kHz and 25kHz transmitters)
 - P.L.L. out of lock warning lamp
 - Excellent sound quality
 - Internal Ni-cad pack (rechargeable)
 - Supplied accessories—240V charger—Whip aerial—earphone
 - Protected by solid aluminium case
- £132.25 inc.

ROTATORS

- S.M.C. starts the world for only the best rotators. We are pleased to advise the most suitable for your installation.
- L1200 Onset £69.00
- KR250 Small bell £25.00
- KR400 Popular bell £129.95
- KR400RC O1 bell £159.95
- KR400RC M0 bell £209.00
- AR40 C01 bell £119.05
- CO45 HD bell £210.89
- HAMV V10 bell £359.00
- KR500 1/2 rev £139.95
- KR500A 1/2 rev £243.00
- KR500A Comp control £279.00
- KR500 HD Az & elev £352.00
- KR500A Comp control £372.00

MICROWAVE M

Model	Price
M1144 30L5	£94.30
M1144 50S	£106.95
M1144 100S	£149.95
M1144 100HS	£150.05
M1143 30L	£169.05
M1143 50	£149.95
M1143 100	£334.00
M1144V	£27.90
M1144 28R	£28.90
M1143 500	£35.65
M1143 28S	£35.65
M1143 28S	£39.90
M1143 144S	£29.90
M1143 144S	£129.95

S.M.C. POLARPHASE II

- S.M.C. Polarphase II
- 2 Metres and 70cm
- Controls polarisation of a X Yagi for maximum signal through full 360°
- Satellite users—Maximise gain and power saving with the S.M.C. Polarphase II
- A unique product



COAX RELAYS

Model	Price
25Amp P.S.U.	£169.00
40Amp P.S.U.	£245.00
2M 3.50	£125.00
2M 10.50V	£125.00
2M 1100W	£197.00
2M 3.100	£192.00
2M 10.100	£175.00
2M 25.100	£255.00
70cm 3.50	£235.00
70cm 10.50	£195.00
70cm 10.100	£335.00



Model	Price
CR170A Cable Entry	£17.23
CR200 3 N	£40.30
CR2500 3 N	£40.30
CR600 3 N	£40.30
CR600 4 N	£41.40
ALL P&P £1.50	

Model	Price
2 Metres less than 1.5 1.50W	£49.00 inc. (£50.29)
70cm less than 1.3 1.10W	£54.00 inc. (£55.10)

U.K. Patent No. 2157894A designed by G2HCG

MAIL ORDER or SHOWROOMS



see previous pages

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS
 Founded 1913 Incorporated 1928 Limited by guarantee A member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the secretary, from whom full details of Society services may also be obtained.

Headquarters and registered office: Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

Telephone 0707 59015. Telex: 265871 (MONREF G) quoting C00083 on list line of message. Electronic mail via Dialcom/Telecom Gold: 78: C00083
 Society and chief executive: David Evans, G3OUF

COUNCIL OF THE SOCIETY

PRESIDENT: W J McClintock, MSc, G3VPK
IMMEDIATE PAST-PRESIDENT: J Heathershaw, G4CHH (Mrs)
HONORARY TREASURER: P F D Cornish, FCA, G3COR

ORDINARY MEMBERS OF COUNCIL

E J Allaway, MB, ChB, MRCS, LRCP, G3FKM
 D S Evans, PhD, FIM, CEng, G3RPE
 J D Heys, G3BDQ
 A McKenzie, MBE, CEng, FIERE, FAES, G3OSS
 B D'Brien, G2AMV
 N F O'Brien, FAAI, FSCA, ACIS, MIMI, G3LP
 F S G Rose, G2DRT

ZONAL MEMBERS OF COUNCIL

Zone A (Regions 1, 2 and 18)	D S Smith, G4DAX
Zone B (Regions 3, 4 and 5)	H S Pinchin, BSc, MBIM, G3VPE
Zone C (Regions 7, 8, 16 and 19)	J Greenwell, AMIEE, G3AEZ
Zone D (Regions 6, 9, 17 and 20)	J N Gannaway, G3YGF
Zone E (Regions 10 and 11)	E J Case, GW4HWR
Zone F (Region 15)	J T Barnes, G3USS
Zone G (Regions 12, 13 and 14)	F Hall, GM8BZX

REGIONAL REPRESENTATIVES

Region 1 B Donn, G3XSN, tel 051-722 3644
(Cheshire, Cumbria, G Manchesl, Lancs, Merseyside)
Region 2 P R Shoppard, G4EJP, tel 0401 50397
(Humbly Grove, N of Humber, N. S and W Yorks)
Region 3 G Ross, G8MWR, tel 0203 616941
(Hereford & Worcester, Shropshire, Staffs, W Midlands)
Region 4 M Shadlow, G3SZJ, tel 0332 556875
(Derby, Humberside S of Humber, Leics, Lincs, Notts)
Region 5 J S Allen, G3DOT, tel 0582 21151
(Beds, Cambs, Northants)
Region 6 N P Taylor, G4HLX, tel 03677 503
(Bucks, Bucks, Oxford)
Region 7 R Sykes, G3NFV, tel 0372 372587
(G London S of Thames, Surrey including part of London N of Thames administered by Surrey)
Region 8 M Elliott, G4VEC, tel 0795 70132
(Kent, E Sussex, W Sussex)
Region 9 A H Hammill, G3VWK, tel 0762 882758
(Cornwall, Devon)
Region 10 D H Phillips, GW4KO, tel 0222 35648
(Dorset, Dorset, Dorset, Dorset, Dorset)
Region 11 B H Green, GW2FLZ, tel 0492 49288
(Clwyd, Gwynedd)
Region 12 M R Hobson, GM8KPH, tel 0796 2140
(Glasgow, Highland, Island Authorities, Tayside)
Region 13 A J Scott, GM8BDX, tel 0361 83221
(Borders, Fife, Lothian)
Region 14 T G Wyllie, GM4FDM, tel 0505 22749
(Central, Dumfries & Galloway, Shetland)
Region 15 R R Parsons, G3HXV, tel 0247 818191
(Northern Ireland)
Region 16 A Owen, G4HMF, tel 0473 51319
(Essex, Norfolk, Suffolk)
Region 17 T M Emery, G3KWU, tel 0703 812435
(I o Wight, Channel Is, Dorset, Dorset, Dorset)
Region 18 I Gibbs, G4GWB, tel 0670 790090
(Cleveland, Durham, Northumberland, Tyne & Wear)
Region 19 R J Broadbent, G3AAJ, tel 01-989 6741
(G London N of Thames, Harls)
Region 20 C R Hollister, G4SQO, tel 0272 508451
(Avon, Gloucestershire, Somerset)

HONORARY OFFICERS

Audio Visual Library co-ordinator: R G Auckland, G2PA
Awards managers: HF: P Miles, G3KDE; VHF: Jack Hum, G5UM
HF manager: E J Allaway, G3FKM
Microwave manager: D S Evans, G3RPE
Observation Service organizer: R J Osborne, G4FJN
Triphos manager: M H Claydon-Smith, G4JKS
VHF manager: K A M Fisher, G3WSN

Correspondence to RAs and honorary officers should be addressed directly to them (QTH), not to RSGB HQ

ANNUAL SUBSCRIPTION RATES

Once-off joining fee: £1.50
 Corporate member: UK and overseas (Radio Communication by surface mail): £18.50
 UK associate member under 18: £8.95. Family member: £7.40
 UK students over 18 and under 25: £10.45 (Applications should give applicant's age at last renewal date and include evidence of student status)
 Affiliated club or society (registered group (UK): £18.50 (including Radio Communication); £14.10 (excluding Radio Communication)
 (Subscriptions include VAT where applicable)
 Membership application forms available from MSD, RSGB HQ



You could be forgiven for wondering what's happened in the editorial page this month—well, in fact only the name has altered. We have made a few changes to the magazine and we are going to make some more in the course of the next few months. Radio Communication is the Society's main means of communication with its members, and during the past year or so we've been listening carefully to what you've been saying about the magazine, and thinking about how best to incorporate all the things you've been asking for. No magazine ever published is ever going to appeal to all its readers all the time, and especially as far as something like amateur radio is concerned. Here at headquarters, we sometimes feel that we don't just have one hobby, we have lots of them all combined under the blanket heading of "amateur radio": hi, vhf, uhf, microwaves, contests, satellites, television, city, data and lots more topics are all incorporated, and in a perfect world we'd produce a separate edition of the magazine each month to cater for them all. However, we'd need a multi-million pound income and resources none along the lines of an international publishing corporation to do that, so we have to do our best to produce something that's interesting to most people at least some of the time!

Now that Radio Communication has come home, so to speak, it's been easier to see how to make it even better than it was. You'll notice first of all that the RSGB News Bulletin has been expanded to a regular eight pages of news and features and that Members' Ads—which are still produced in-house, to the much shorter deadlines we've been working to for some months—have moved to the back of the magazine. The reason for this is simply that many members have said that they like the Bulletin and, indeed, it's the first thing they read. So, beginning with this month's issue, there's more of the Bulletin and it's still produced in the same deadline as always—which means that some of the news is only about two weeks old. In the last year or so, we've gained a reputation for fast, accurate and in-depth news reporting which we're very proud of and which we intend to keep—and you can help by letting us know about anything newsworthy which you've been involved in or know about. Black-and-white photographs will also be gratefully received by the Bulletin team.

This new page is also a reflection of change—it'll replace the more formal "editorial" which we used to have. Each month I'll be, if you like, looking at the view of the amateur radio world as seen from Potters Bar and addressing topics which seem important to us.

As 1986 draws towards its end, it seems important to say loudly and clearly that the most important thing to all of us who work for the Society—staff and volunteers both—is amateur radio and its well-being. Despite what you might think, we're all immersed in it, live it and care deeply about it—if we weren't we couldn't possibly begin to do the job or give up much of our spare time to it. The Society certainly doesn't claim to be perfect, but we can certainly claim that, in the words of the old cliché, its heart is in the right place. Together with that claim goes the certain knowledge that if we all stick together and work together, we will get the best results for our hobby.

We hope and believe that Radio Communication can reflect that stance, and we hope you'll like the changes which we're making and others which we have in mind. Above all, the members are the Society—you and others like you make up the Radio Society of Great Britain and without you we can't function. Help us to help you—tell us what you think and what you need and we'll do our very best to help. That's what we're here for.

David Evans, G3OUF

A 1.8MHz AUTO TUNING VERTICAL ANTENNA

T D FORRESTER,
G4WIM*



FOR MANY YEARS I have had a keen interest in lower-frequency reception, usually using a random length of wire, or similar antenna. However, on obtaining a Class A licence, a more efficient antenna was needed and, given the constraints of a rear garden which is only some 40ft in length, a vertical antenna was the obvious choice. It soon became apparent that some remote means of tuning the antenna from the comfort of the shack was required, and initially a motorized loading coil was fitted to the base of a 27ft vertical alloy pole.

*12 Lime Close, Hartwell, Northampton.

While this method of tuning worked, it left a lot to be desired from an efficiency point of view. This article describes the construction of a practical automatic system which could in theory be applied to a wide variety of antennas on different bands.

System operation

The heart of the auto tuning system is a phase detector (Fig 1), which is located at the base of the antenna, and feeds an error voltage back to the shack where it is amplified to drive a servo-motor at the top of the vertical. This phase detector generates a de signal which goes positive if the antenna is resonant *below* the applied frequency, and a negative signal if the antenna is resonant *above* the applied frequency. If the antenna is resonant at the applied frequency, no error voltage is produced.

IC1 serves as a buffer amplifier to drive the signal at a low impedance, to minimize noise pick-up into the shack for amplification etc. Fig 2 details the servo amplifier, which is located in the shack for several reasons:

- (a) safety—no mains being fed to the base of the antenna to power the circuitry;
- (b) convenience—to keep a check on where the antenna is resonant;
- (c) to monitor the current drawn by the servo motor, to detect fault conditions;
- (d) ease of initial setting up.

As many transceivers incorporate circuitry to protect the final transistors against high vswr, there is a possibility that sufficient power may be initially unavailable from the transceiver. To overcome this problem (which didn't occur often in the prototype), S1 and S2 are included to force the antenna high or low frequency as required, until enough power is available from the transmitter to enable fully automatic operation.

S3 is included to disable the automatic tuning and in my case, to allow the vertical to be used as a $\lambda/4$ vertical for 10MHz. This switch also prevents the antenna attempting to tune itself to an erroneous frequency by picking up radiation from any other antenna which may be in use for transmitting.

M1 indicates when the antenna is resonant (zero phase error). M2 indicates the amount of current the motor is taking. LP1 illuminates when the antenna is tuning high frequency, and LP2 illuminates when the antenna is tuning low frequency.

Phase detector head

Fig 1 details the circuitry used at the base of the antenna, and it should be noted that the phase detector is in a separate screened enclosure to the buffer amplifier. This is to prevent the buffer amplifier being affected by the transmitted rf field, and also to this end feedthrough type capacitors along with RFCs are used to further isolate the buffer amplifier.

C1 and R1 provide the necessary 90° phase shift to enable the circuitry to produce zero volts output for a resonant frequency condition, and also form a potential divider for the reference voltage to be applied to the junction of R3 and R5. T1 and R3/R5 produce a voltage which is proportional, and in phase to the current flowing in the antenna. The voltage reference from C1/R1 is fed to this network, with the result that if voltage and current are in phase, ie the antenna is resonant at the applied frequency, then they cancel exactly and no error voltage is generated. T1 consists of a ferrite ring with 20 turns of 0.5mm enamel copper wire wound round it.

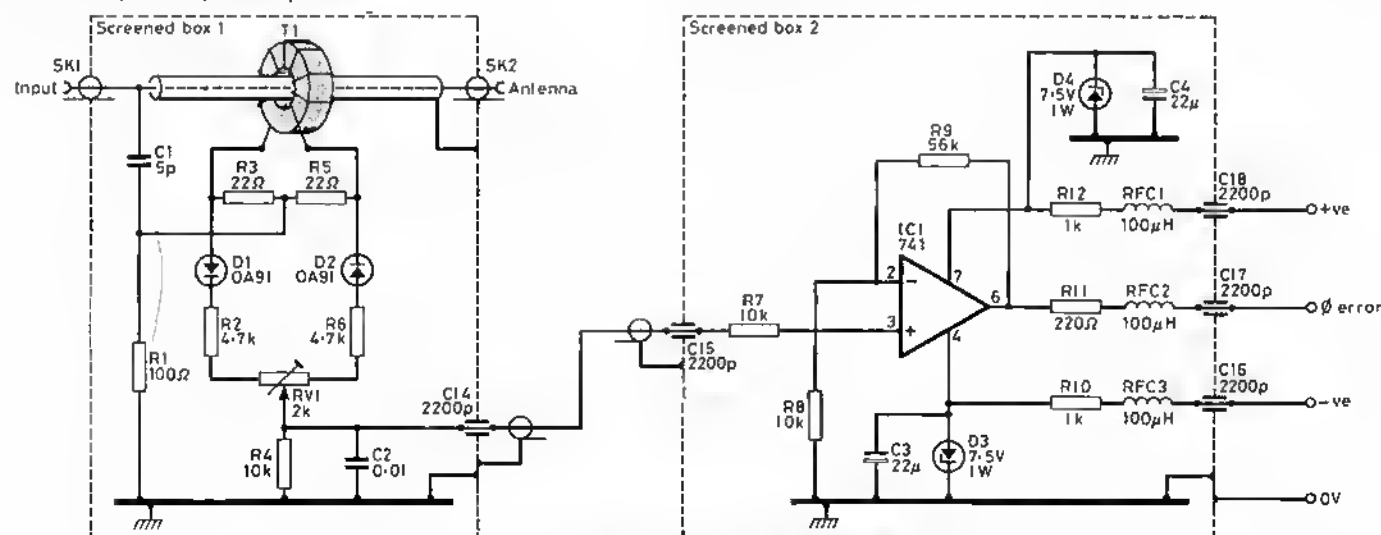


Fig 1. Phase detector head and buffer amplifier

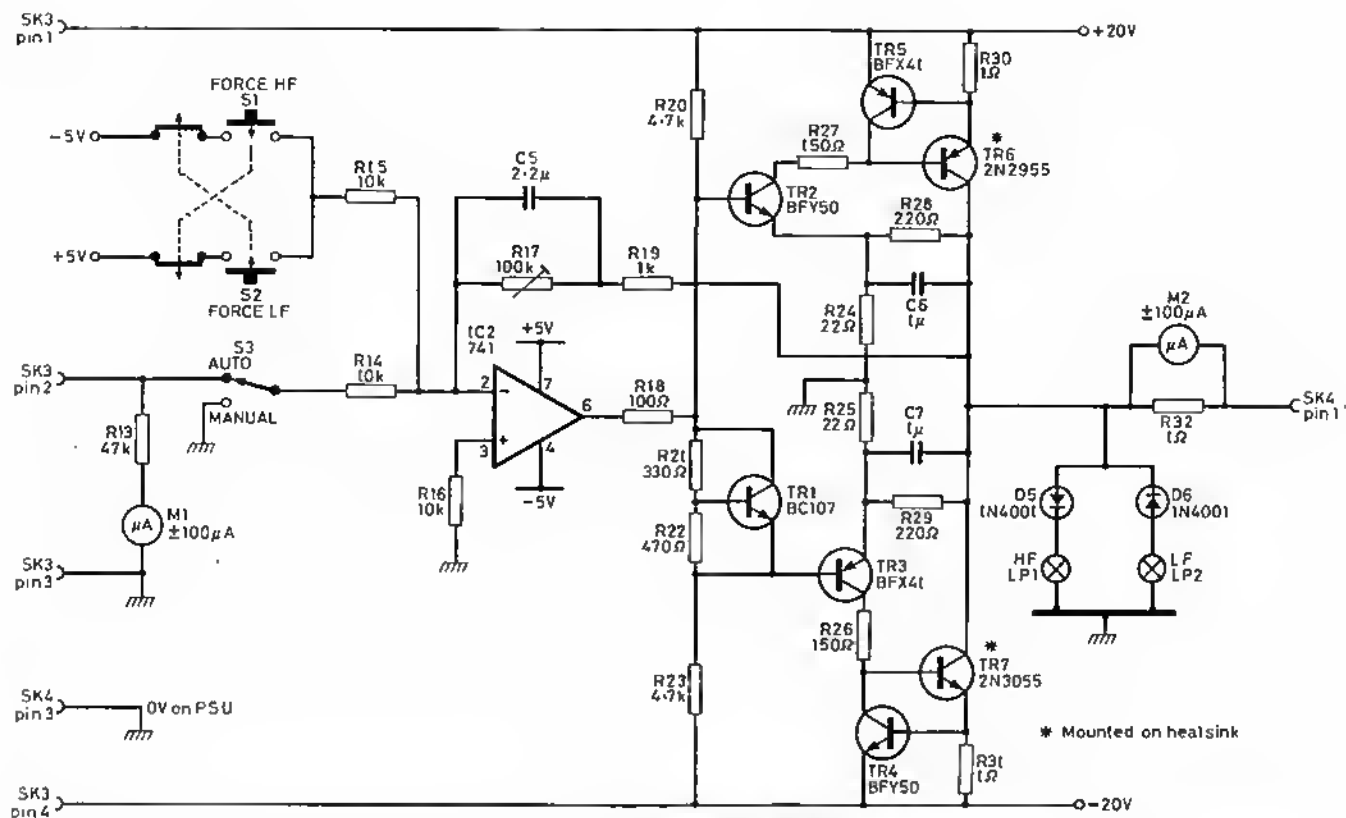


Fig 2. Servo amplifier and controls

RV1 is to adjust for any slight imbalance in D1 and D2. The error voltage is amplified by IC1 in a separate box, and R4 prevents any stray pick-up when the antenna is not in use. The power feed and signal output connections are fed to the radio shack, via four-core screened cable, where they plug into the control box by means of a five-way DIN plug (see Fig 3).

Servo amplifier

The error signal from the phase detector is first displayed on M1 before being amplified by IC2. TR1 sets the quiescent current through TR7 and TR6, while TR2 and TR6 form a $\times 10$ voltage amplifier for positive-going voltages and TR3/TR7 for negative-going voltages. TR4 and TR5 limit the maximum current in either direction to typically 800mA, which is necessary in the event of the servo motor lead screw hitting one or other end stops. M2 indicates $\pm 1A$ with R32 being the meter shunt.

The power feed to the servo motor is taken via a separate two-core lead to the base of the antenna, where it is filtered to rf before being taken to the top of the mast to power the motor. It should be noted that:

- (a) the earth return for the motor is directly at the psu zero volts, to prevent cross-talk in a common earth;
- (b) a separate cable is used for the motor feed, again to prevent cross-talk;
- (c) screened cable is used from the base of the antenna mast to the motor, and the braid of this cable is clamped to the mast by means of jubilee clips, at 3ft intervals, to prevent circulating rf current in the motor feed and so lowering efficiency;
- (d) the types of transistors for TR6 and TR7 are not too critical, providing they can handle up to 2A.

The power supply unit

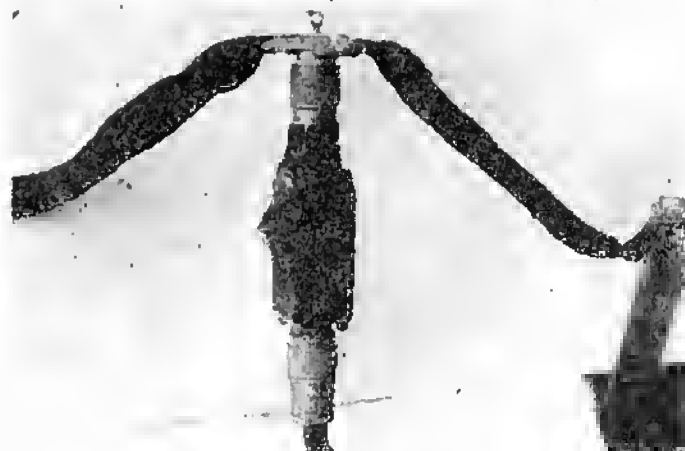
The power supply circuit detailed in Fig 4 is conventional and needs no special mention, apart from IC3 and IC4. These 1A regulators are very useful and cheap, but are prone to burst into oscillation at 1-2MHz—not a good idea for 1.8MHz reception. If instability is encountered, fit some 0.22µF capacitors close to the devices. Also note that the connections for the -5V regulator are different to those of the +5V regulator.

The mechanics

So far this article has concerned itself with the electronics, which are fairly straightforward. However, the mechanics, while being simple, need a little care and thought to ensure reliable operation in all weather conditions. Fig 5 gives the overall scheme of things in use at G4WIM and has proved reliable over a period of 12 months or so.

During the development of the mechanics, several systems of tuning were tried. Eventually, after much experimentation, the system described here is believed to be optimum. However, I would be pleased to receive correspondence regarding alternative methods.

The size of the loading coil is primarily determined by the size of the capacity hat that can be tolerated. To minimize losses, the loading coil should be of as low inductance as possible, while still remaining resonant



The phase detector in position at the base of the antenna

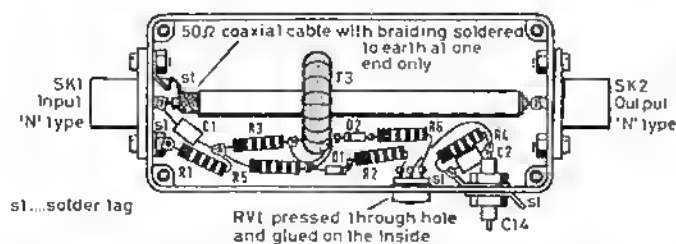


Fig 3. Phase detector assembly, view inside diecast box. When the assembly is completed and proved to be functioning, the components are held in place with a silicone-based adhesive and the lid is sealed in place likewise

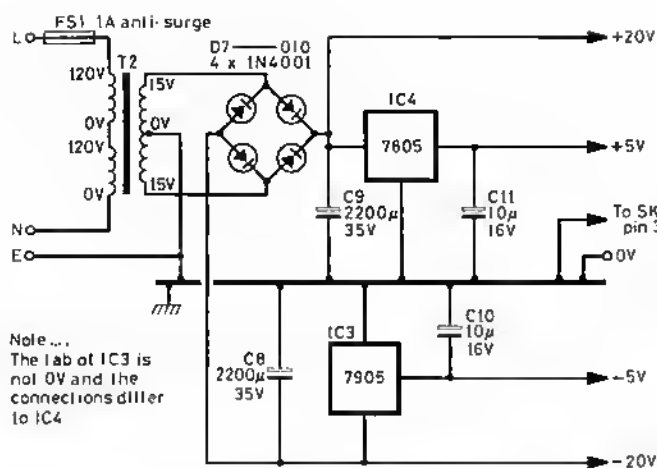
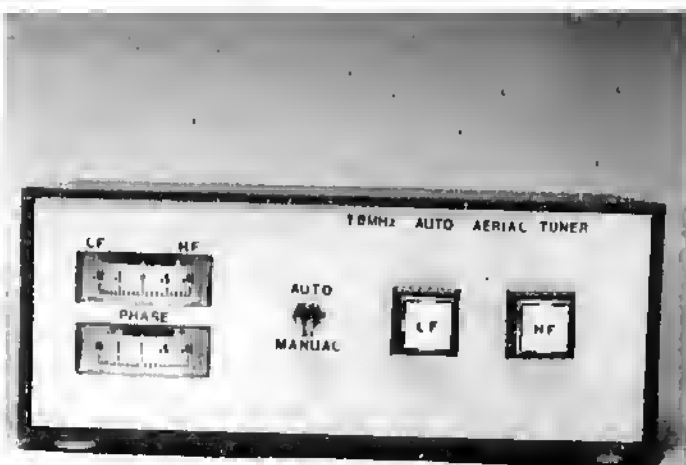


Fig 4. Power supply unit



The servo amplifier and control unit

with the capacity hat at just above 2MHz, then only a very small amount of ferrite is required to lower the frequency down to 1.85MHz or so.

The capacity hat in use at G4WIM consists of six strips of 1/4in-thick pcb, each one 24in long and 0.5in wide. To prevent these strips flapping around in the wind, an extra strip is soldered at 90° along the length to make it more rigid. All sharp corners are filed off to prevent point discharge.

The capacity hat is secured to the top of the loading coil by a disc of 1/4in pcb, 6in diameter, with a circular hole in the centre for the 2in diameter srpb tube to pass through. The capacity hat strips are then bolted to this disc, and short pieces of wire from these strips to the disc ensure good electrical connection. The disc is fastened to the mast by four blocks of Tufnol (or similar material) which are drilled and tapped accordingly.

The top sleeve has two slots cut into it, to prevent the plate, which raises and lowers the ferrite, from rotating. The two nylon bushes for the tuning shaft are drilled and tapped at each end to locate them in the 2in diameter srpb tubing. The cap, which is glued into place, serves to keep the worst of the weather out. Initially, pvc tape was wound around the loading coil in an attempt to keep the coil dry; however, the tape served only to retain moisture and has since been removed.

Instead of describing my tuning assembly in great detail, I feel it is best left to individual constructors to use their ingenuity and whatever materials they may have available. However, the following hints may be of some use to constructors designing their own system:

- (1) Keep all metallic objects out of the middle of the loading coil. Use plastic nuts and bolts etc.
- (2) Lubricate the moving parts well with a thick grease.
- (3) Use "Loctite" at the final assembly, when the mechanics have been well proven "on the bench".
- (4) Solder wide copper braid to any connection which is to be clamped under

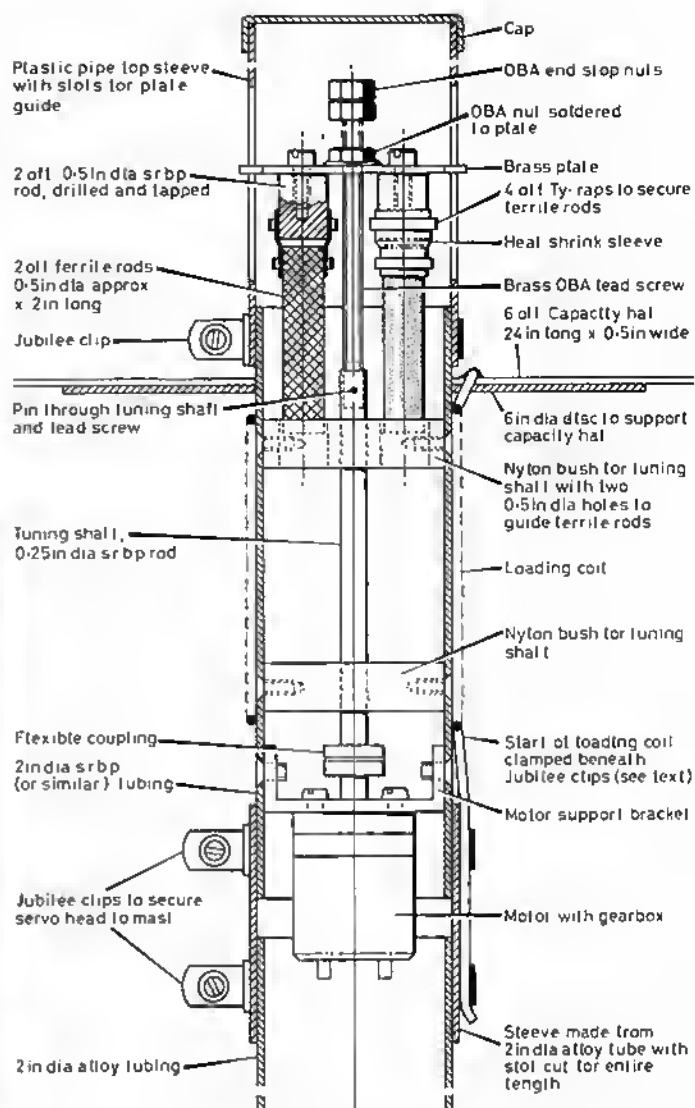


Fig 5. Cross-section of tuning assembly

a jubilee clip, then cover in grease, to slow down erosion caused by dissimilar metals (alloy mast/copper wire).

(5) The phase detector and buffer amplifier were built into boxes; small watertight diecast boxes with N-type connectors being used on the phase detector.

Initial adjustments

When the mechanics have been assembled on the masthead, with the ferrite fully withdrawn, the mast should be erected in its intended location and its resonant frequency and impedance measured at the base of the antenna using a noise bridge and receiver.

The number of turns on the loading coil should be adjusted to give resonance at about 10kHz above 2MHz, and the impedance noted. With a reasonably efficient earthing system and a low-loss loading coil, the impedance for a 30ft vertical should be 5-20Ω. Therefore, a simple toroidal matching transformer should be used for best effect.

Notes: (a) The above should be done with the wiring and RFCs in place for the motor feed.

(b) The lower the earth resistance, the lower the feed impedance. Do not try to make it match the 50Ω resistor.

Check by means of a suitable power supply that the mechanics tune the antenna across the entire band, and the impedance does not increase unduly at the lower frequency end of the band, indicating increased losses caused by the ferrite loading. Leave the antenna resonant at a known frequency, say 1.950kHz.

If all seems well, the phase detector can be balanced up by applying a few tens of watts to the input, while the output is terminated in a purely resistive load. RVI is then adjusted for a null on M1 of the control box. Initially R17 should be set midway.

Connect up the system as shown in Fig 6 and set the control box to manual. Apply about 20W at the previously-set resonant frequency and check that by varying the applied frequency by a few kilohertz either way that the phase as indicated on M1 moves from the null position.

Move the transmit frequency by, say, 20kHz, and check that by pressing the H or L button it is possible to bring the phase indication to zero. Now switch to auto and move the frequency again about 20kHz. The antenna should track the applied frequency. If not, adjust R17 to increase the gain to a point where the servo does not "lump" or overshoot. If the system refuses to track it is most likely that the connections to the motor need to be reversed.

The system in use at G4WIM consists of an Icom 720A and AT500 auto antenna tuning unit. The AT500 ensures that sufficient power is fed to the antenna even when it is 200kHz off resonance, as the Icom 720A powers down with a vswr greater than 2:1.

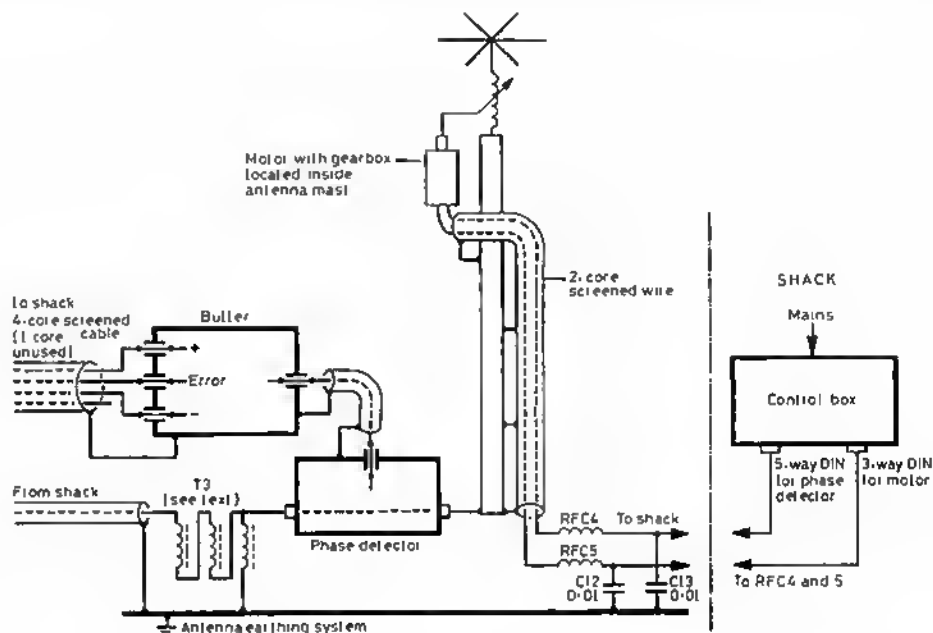
Notes on the earthing system

So far no mention of the earth for this antenna has been made. Obviously for a vertical antenna a good earth is essential, and this can only be achieved by hard work. Typically the earth should consist of three or four stakes driven in the earth to a depth of at least 4ft, while as many radials as possible should be buried just below the surface.

At G4WIM there are six earth stakes, and 10 radial wires each about 40ft long. Many short radials are to be preferred to one or two long ones, as most of the current flows immediately around the base of the antenna. The earth stakes are 1in diameter copper pipes, which are then bonded together using a heavy copper braid. The radials used are 5A pvc-covered wire.

A good way to get an idea of the earth losses is to measure the feed impedance at the base of the aerial with the loading coil shorted out, using a noise bridge, at the antenna's natural resonant frequency, about 10MHz for a 30ft vertical. If all is well this natural resonance should indicate a feed impedance of about 35Ω; a higher value probably indicates a poor earth.

Fig 6. The antenna system



Components list

R1, 18	100Ω	D1, 2	OA91
R2, 6, 20, 23	4.7kΩ	D3, 4	7.5V 1W zener
R3, 5	22Ω 1W	D5-10	IN4001
R4, 7, 8, 14, 15, 16	10kΩ	IC1, 2	741
R9	56kΩ	IC3, 4	7905
R10, 12	1kΩ 2W	TR1	BC107
R11	220Ω	TR2, 4	BFY50
R13	47kΩ (1)	TR3, 5	BFX41
R17	47kΩ (2)	TR6	2N2955 (3)
R19	1kΩ	TR7	2N3055 (3)
R21	330Ω	T1	Cirkit Type T68-2
R22	470Ω	T2	Sloek No 55-00682
R24, 25	22Ω 0.5W		240V primary, 15.0-15V secondary at 1.5A
R26, 27	150Ω 1W	T3	See text
R28, 29	220Ω 1W	SK1, 2	50Ω 'N' type
R30, 31	1Ω 2W	SK3	5-pin 180° DIN
R32	1Ω 2W (1)	SK4	3-pin 180° DIN
RV1	2kΩ preset	RFC1, 2, 3	100μH SC30 or similar
C1	5pF silver mica	RFC4	RS Components 5A
C2, 12, 13	0.01μF ceramic	RFC5	RS Components 5A
C3, 4	22μF 16V tantalum		±100μA centre zero
C5	2.2μF 63V paper	M1, 2	24V 100mA
C6, 7	1μF 35V paper	S1, 2	Momentary action dpco
C8, 9	2,200μF 35V electrolytic	S3	Toggle spco
C10, 11	10μF 16V tantalum		
C14-18	2,200pF 100V, bolt-in type		

Servo motor part No 432G, available from: Como Drills, The Mill, Mill Lane, Worth, Deal, Kent CT14 0PA; tel (0304) 612734.

Notes

(1) These values are for 100μA meters, but may be changed for other sensitivities.

(2) Initially use a 100kΩ preset to determine the required value, then replace the preset with this value.

(3) These transistors should be mounted on a suitably-sized heatsink.

Notes on the loading coil

Again to minimize losses in the system, the loading coil should be wound with as heavy a gauge wire as possible, not necessarily silver plated. However, to prevent resistive losses across the coil the wire should be enamelled. Great care should be taken with the connections to the coil, especially with the connection to the alloy mast, as this connection will be prone to erosion caused by the contact of dissimilar metals.

The exact number of turns on the coil will be determined by a number of factors, the main ones being the size of the capacity hat and the diameter of the coil. The loading coil at G4WIM is wound with 16swg enamelled copper and is approximately 5in long.

Variations on the theme

To make this antenna even more useful, it should be possible to include relay switching on the loading coil to enable the servo to resonate it on the 3.5MHz as well. However, this has not yet been tried at G4WIM, due to the problem of finding a suitable relay which can withstand the very high rf voltages generated.

As mentioned previously, if the total length of the antenna is chosen carefully, then it could also be used on, say, 7 or 10MHz.

Conclusions

While this antenna is the result of 12 months' work, it can still be improved upon with regard to the size of the capacity hat, although due to the circumstances at G4WIM this is not possible.

Likewise, ideally the earthing should consist of 100 or more λ/4 radials. Obviously this is not possible in a garden only 40 by 35ft, but with careful use of a spade it is possible to bury a good deal of wire without damaging the turf too much.

Finally my thanks must go to G3ONT for his help and advice.

AN EPROM KEYER FOR BEACON USAGE

D J Robinson, G4FRE, BSc, member, RSGB Microwave Committee

IN MAY 1981, while on holiday in Denmark, I was asked to build a 10GHz transmitter to enable Rolf Niefind, DK2ZF, to investigate the microwave sea path between the coasts of Denmark and England. While designs for the rf equipment needed for the beacon were readily available, there were very few designs suitable for beacon keyer usage where the memory device must be capable of retaining its message even after the power is removed. This type of memory is classified as "non volatile". A search of past radio magazines only produced the G3ZSS diode keyer [1], which was considered outdated and had only 128 bits of "memory" for the message. Consequently a suitable design based on an erasable programmable read only memory (eprom) was created, as these were available at a relatively low price and would retain the data almost indefinitely, even with the power removed, but could be reprogrammed if necessary.

Recently it has become apparent that there is a need to give the design a wider circulation judging by the number of potential beacon builders who, like myself, are at a loss for a keyer design after building the beacon part. The keyer described here was eventually incorporated into the 10.368+830MHz beacon GB3MHX, located at Marlesham Heath, near Ipswich.

Circuit description

The circuit (Fig. 1) was designed using CMOS as far as possible to minimize current consumption. IC1 and IC5, both type 4011BE, contain a quad of two input NAND gates. IC2 and IC3 are 12-stage binary counters, type 4040BE. IC4 is a 32768-bit eprom, arranged as a 4096-by-8-bit words type 2732 which is used to store the desired message to be transmitted. It also contains a pulse which indicates the length of this message. IC6 is a TO220 packaged 5V positive regulator, type uA7805UC, used to allow the keyer to be run off a voltage between 7 and 25V.

IC1a and b form an oscillator, the frequency of which is determined by RV1, R2 and C1. The exact frequency of operation should be adjusted to give the desired keying speed, given that with the present division ratio:

$$\text{Speed (wpm)} = \text{oscillator frequency (Hz)} / 1,706$$

Hence, for 12wpm the oscillator should be set to 20,480 Hz.

Dave Robinson was a short-wave listener for many years before becoming G8JMO. After joining the University College of North Wales, Bangor Amateur Radio Society, GW3UCB, and becoming indoctrinated with the joys of contest operating, he obtained G4FRE. In 1979 he joined British Telecom Research Laboratories.

He is a member of the VHF Contests and Microwave committees, and of the Sheppey Contest Group. His operating interests include the bands above 1GHz and 70MHz, and he provided the station for the recent Square Basheis expedition to Scolland. A photograph of the Square Basheis at John O'Groats is published on page 788.

The oscillator is followed by divider IC2 producing a 10Hz square wave at pin 14 (input divided by 2,048) which is fed to drive IC3. It also generates an audio waveform of 640Hz at pin 5 (input divided by 32) which is subsequently used to generate a sidetone by IC5b through C2 if required. The waveform obtained from IC2 is fed to IC3 which is used as an address generator. This sequentially generates all the desired addresses in memory IC4, which contains the keying sequence. IC1c and d are used to reset the address generator at the end of the message, as determined by a pulse programmed into IC4 appearing at pin 17. The cw message appears at IC4 pin 9. This waveform is inverted by IC5A and used to drive TR1 and its L,E,D, showing the keyed output. This inverted waveform is also used to drive IC5d, which is used to again invert the message signal before driving the keying transistor TR2. This output may be directly connected to the frequency shift keying circuit of the Microwave Committee's kit source [2]. In this configuration the fsk conforms with the agreement made at the IARU Region 1 conference in Hungary, April 1978, as described in [3].

So far IC4 has been used as a 4kbyte-by-2 memory to contain one message. It is possible to use the remaining 4kbyte-by-6 to store a further three messages along with their associated control channels. These outputs may be selected as required to indicate, for example, low power mains failed operation, as allowed by the beacon licence.

Message channel

The series of characters in each message should first be written down. Each character is then converted to its morse equivalent using binary "1" to indicate key down and binary "0" to represent key up. Next, letter spaces (000) and word spaces (0000000) should be added. If an unmodulated carrier is desired, this should be input as a series of "1"s.

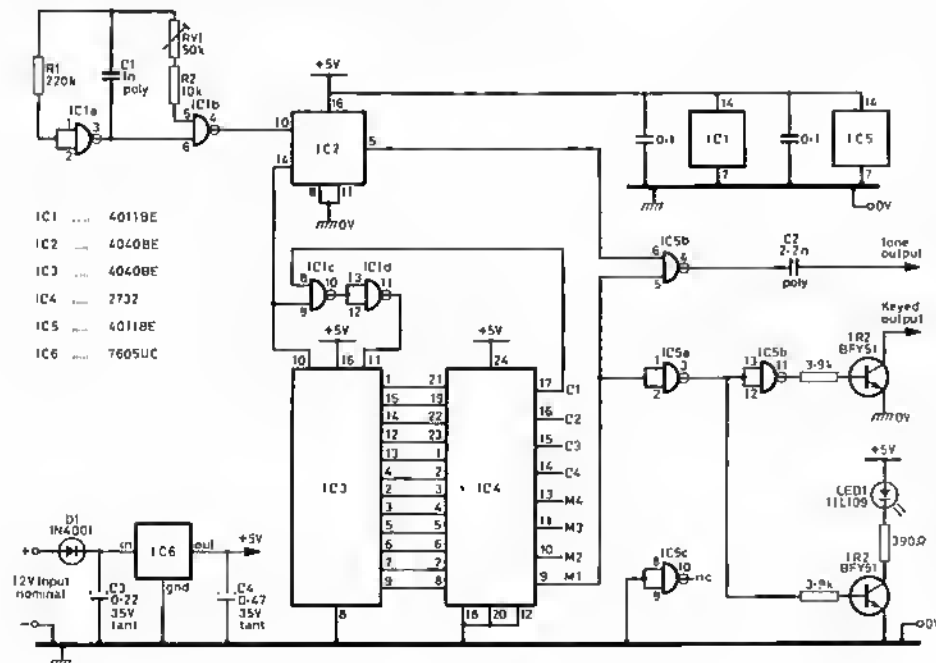


Fig 1. Circuit diagram of the keyer. All resistors 0.25W carbon. Capacitors C1,C2 polystyrene; C3,C4 tantalum 35V working; all other capacitors, ceramic plate. TR1, TR2: BFY51 or similar. D1 1N4001 or similar. RV1: miniature carbon preset, preferably multi-turn. D2 TL1109 or similar L.E.D. All pins not shown above have no connections. M1-4 are message outputs, CT-4 are control outputs (see text).

For example, suppose the message were to consist of the callsign GB3MHX, followed by a blank carrier. At this stage the binary listing might be as follows:

```
1110111010001110101010001010101110111000111011100
01010101000111010101110000000111111111111111111111
```

This message is 99bits long.

Control channel generation

This consists of binary '0's except for a single '1' which is positioned to correspond with the bit after the end of the associated message. Hence, in the above GB3MHX example it would consist of 99 binary '0's followed by a single '1', (a total of 100 bits), ie

```
000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000001
```

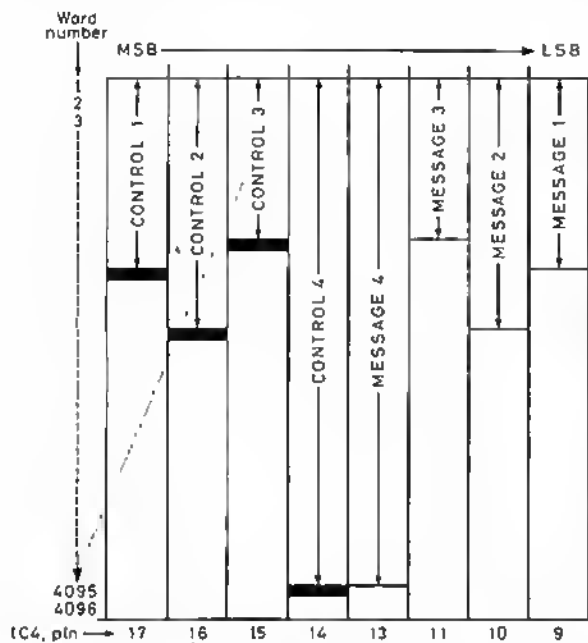


Fig 2. Memory organization of keyer

Combination of messages

It is assumed here that messages and associated control channels are arranged in the eeprom as shown in Fig 2. This figure also shows at which pins of IC4 the various digital streams will appear. If a changeable message is desired, and allowable by the beacon licence, a two-pole four-way switch may be used to select the appropriate message/control channel pair to be fed to the output circuitry.

Having converted all the channels as demonstrated above, they are written to conform with Fig 2. If all four messages were to contain the message GB3MHX the listing would be:

WORD	BINARY	HEX	WORD	BINARY	HEX
1	00001111	0F	10	00000000	00
2	00001111	0F	11	00000000	00
3	00001111	0F	12	00000000	00
4	00000000	00	13	00001111	0F
5	00001111	0F	until		
6	00001111	0F	98	00001111	0F
7	00001111	0F	99	00001111	0F
8	00000000	00	100	11100000	F0
9	00001111	0F			

This code is then blown into the eeprom using a suitable programmer. For those interested in building their own programmer or seeking ideas to build their own programmer, references [4] and [5] may prove useful.

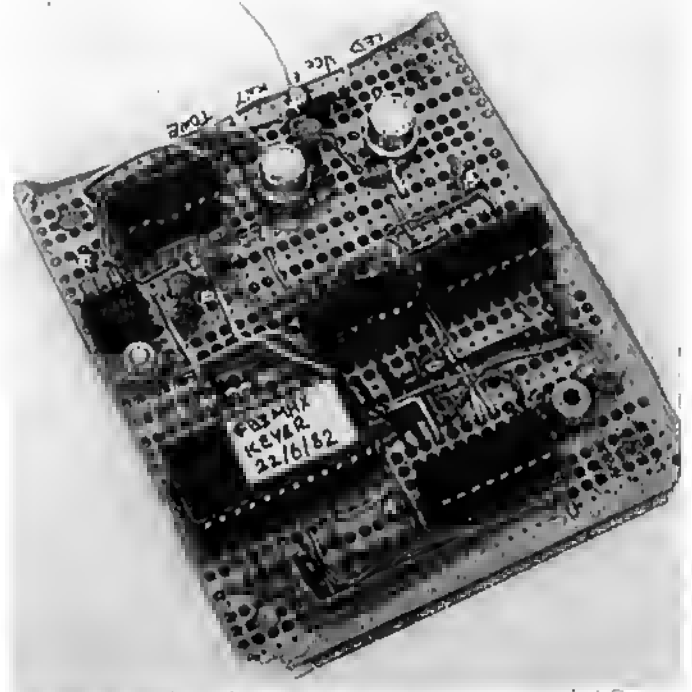
It may be considered that the generation of the hexadecimal code for the keyer is rather a long, menial task for humans to do, and the time taken would be considerably shortened if it could be computerized. After recollecting making two eeproms manually using the above method, a program has been recently developed for the BBC Model B computer to do the above process automatically. This program, although written specifically for the BBC computer, should be readily adaptable to other computer systems by those conversant with their machine's operating

system and Basic dialect. The resulting code produced can be blown into an eeprom using one of a number of commercially-available programmers. If any prospective beacon builders cannot program the memory chip themselves, they are invited to contact me via the Microwave Committee.

Construction

As the signals in the keyer are at a relatively low frequency, the method of construction is fairly uncritical. The original keyer was built on a piece of prototyping board, as shown in the photograph 3. IC holders were used, but are not vital to the circuit operation. The keyer consumes around 25mA from the 5V regulator. In the interests of reliability the regulator is mounted on a small heatsink (RS type or equivalent).

The board is ideally mounted in a 95 by 120 by 30mm diecast box. All inputs and outputs to the keyer are made via 1nF bolt-in feedthrough capacitors, to provide the maximum screening between the rf and lf components in the beacon.



Photograph of the author's prototype keyer

Conclusions

The keyer has, to date, been operating for over five years in the transmitter without any failures, making the "engineering standby" obsolete. It did serve its original purpose when it identified the 10GHz transmitter to DK2ZF on 9 September 1981 over the 592km path between EP31c and AM77j.

It is hoped that by publishing the above design it might encourage the building of more vhf, uhf and microwave beacons in the UK. Groups intending to activate a beacon are invited to contact the appropriate RSGB beacon co-ordinator; B Bower, G3COJ, in the case of vhf/uhf beacons, and P G Murchie, G4FSG, in the case of beacons above 1GHz. Both will be pleased to supply further information, along with a copy of [3].

Acknowledgements

Firstly, to Rolf Niefind, DK2ZF, for accidentally providing the initial incentive needed for the project. Secondly, to Dave Roberts, G8KBB, for assistance rendered in producing the final design.

References

- [1] "A digital morse code generator," P Bacon, G3ZSS, *Rad Com* February 1974, pp86-7.
- [2] "A high-quality uhf source for microwave applications," RSGB Microwave Committee, *Rad Com* October 1981, pp906-10.
- [3] *Guide to Beacon Licensing*, RSGB.
- [4] "An intelligent eeprom programmer," J H Adams, *Electronics & Wireless World* commencing November 1984, p43.
- [5] "EPROM programmer for the Apple 2", P B Unstead & A Blunden, *Electronics & Wireless World* May 1986, pp28-30.

MEASUREMENTS ON MODERN VHF / UHF FRONT-ENDS

Ian F White, G3SEK*

PART 2

Noise measurements

Measurements related to noise are another stock-in-trade of front-end performance testing. In the test methods I shall describe, the test signal itself is a known amount of broadband rf noise, and we are interested in measuring the relative difference in noise levels when the test signal is applied. Noise levels are most conveniently measured at the audio output of the receiver. When you do this, you are relying on the audio output being strictly proportional to the noise or signal level, so the receiver's age must be switched off for all the tests to be described. You then need to be careful to avoid limiting or distortion in any rf or af stage [1]. *Always repeat your measurements*, especially where random noise is involved. Repeat them under the same conditions, to get some idea of the random errors. Then alter the rf and af gain settings and repeat them all again. If the results change, find out why.

A suitable instrument for relative af noise power measurements is a rectifying meter as in Fig 7, which can be pre-calibrated in decibels by calculation [2]. This is essentially a peak-detecting instrument, so you need to be particularly careful that noise peaks aren't being significantly clipped by overloading of any stage in the receiver. More complex rms-detecting audio noise level meters are less prone to this error, but with care the simple meter in Fig 7 is quite adequate. With such a meter you can accurately measure (signal + noise)/noise ratios, as required in any of the following techniques for sensitivity measurement.

Sensitivity measurements

VHF/UHF receivers are extremely sensitive. As I explained in the previous article on front-end design [3], a good 144MHz front-end would have a noise figure of about 2dB, and would be able to detect signals as weak as 20 nanovolts. At those levels, accurate sensitivity measurements using an attenuated signal generator are extremely difficult. The signal-generator technique is still satisfactory for hf receivers and relies from the older generation of deaf vhf/nhf receivers; but accurate measurements on low-noise systems require an extremely well screened signal generator and meticulous attention to both practical and theoretical details. For modern vhf/nhf front-ends, better techniques for sensitivity measurement are those that stay as close as possible to the fundamental concept of noise temperature [3]. Best of all, measure the noise temperature itself.

Noise temperature measurement techniques are based on supplying a known amount of excess noise to the rf input of the receiver, and measuring the change in noise output. If the receiver noise temperature to be measured is T_{RX} , and the noise source has a noise temperature T_{DN} when switched on and T_{DN} when switched off, the system noise temperatures are:

$$T_{SYS} = T_{RX} + T_{DN} \quad (\text{noise source on}), \text{ and}$$

$$T_{SYS} = T_{RX} + T_{DN} \quad (\text{noise source off}).$$

The noise power from the receiver is proportional to the system noise temperature, so the on/off power ratio Y is given by:

$$Y = (T_{RX} + T_{DN}) / (T_{RX} + T_{DN})$$

If we know T_{DN} and T_{DN} , and can measure Y , we can calculate T_{RX} .

$$T_{RX} = (T_{DN} - Y T_{DN}) / (Y - 1)$$

The hot/cold method

The main problem is to generate rf noise at two different known noise temperatures T_{ON} and T_{OFF} . The simplest way is to use the thermal noise from a 50Ω resistor at two known physical temperatures (Fig 8(a)). This is called the hot/cold method, and is the closest you can get to a fundamental measurement of noise temperature. For the best accuracy you need a large

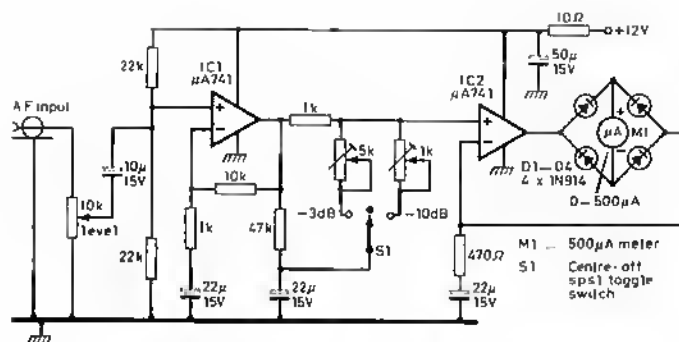


Fig 7. A peak-responding audio voltmeter for use in measuring (signal + noise)/noise ratio. For full details see [2]

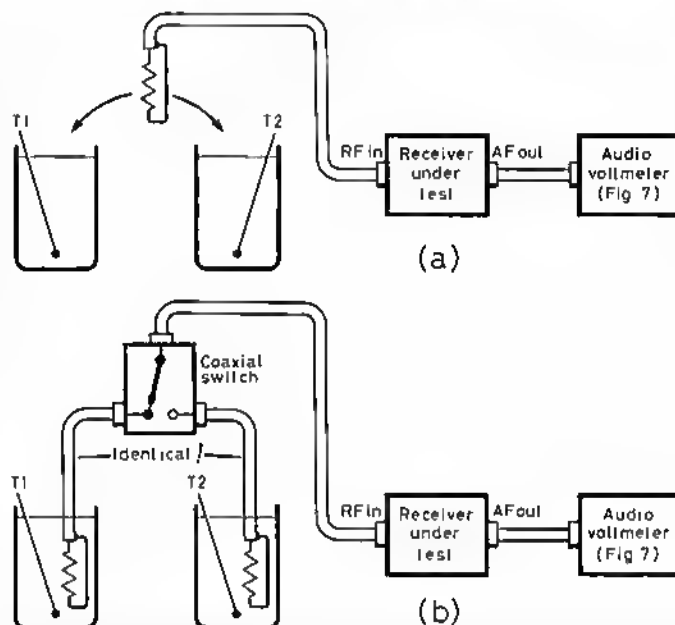


Fig 8. The hot/cold method for measuring noise temperature. The basic method (a) involves transferring one resistor between two temperature-baths. The two-resistor method (b) is more convenient but requires even more care in setting up

difference between the two temperatures. Resistors don't much like being roasted, so the hot end of the range can't go too high. The cold end can be extended down to 77K if you can get liquid nitrogen from your friendly local laboratory (in rural areas, ask the AI man), or to about 196K in crushed solid CO₂. Unless you know how to handle these potentially hazardous materials properly, you'd be safer to use a shorter temperature baseline, eg between melting ice and hot water. With care and a good laboratory thermometer, you can still obtain quite accurate results.

Even the fundamental and basically simple hot/cold method has pitfalls for the unwary. To present an accurate 50Ω termination at both temperatures, the resistor must have good rf characteristics and a low temperature coefficient. Corrections need to be made for losses and thermal noise from connecting cables. There may be errors owing to drift in system gain while the resistor is being warmed up or cooled down, and measurements can become very tedious and slow. It's far quicker to compare noise powers from two 50Ω resistors at different temperatures (Fig 8(b)), but then the two resistors and all their associated connections need to be identical in all respects (except temperature) so the test system itself requires careful preliminary checking before the results can be trusted.

Non-thermal noise sources

Another way of generating noise is to use a non-thermal source, such as the noise generated in certain kinds of diode. The traditional method was to use a thermionic diode or a silicon microwave detector diode in forward conduction. Nowadays a better and cheaper method for amateurs is to use a diode in reverse breakdown, eg a zener or the base-emitter junction of a silicon transistor. With careful control of diode current, the long-term noise characteristics can be quite repeatable.

It is absolutely vital to make sure that the noise generator represents an

* 52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP.

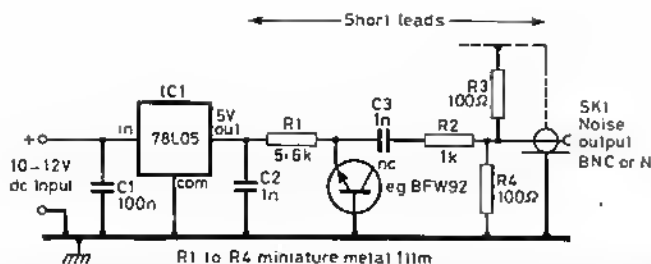


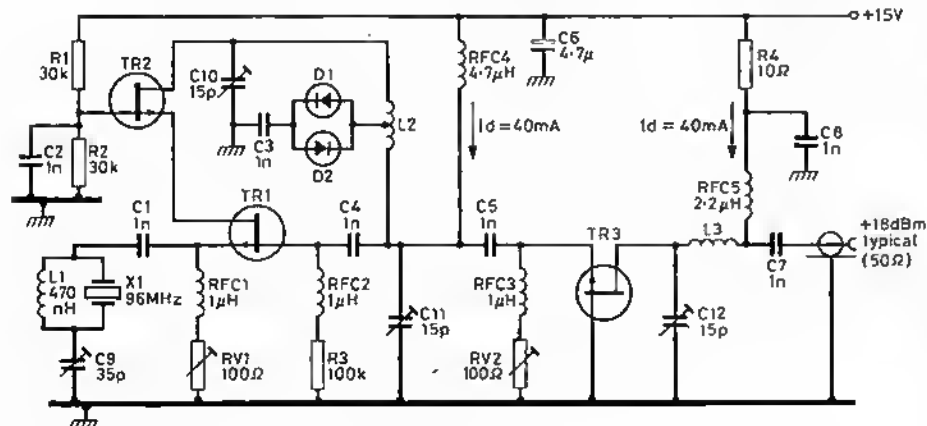
Fig 9. A diode noise generator with low vswr in "on" and "off" states. The circuit from C2 to the output socket SK1 is built with the shortest possible leads on a copper groundplane (pc board) soldered directly to the back of SK1. R1 may be altered to maximize noise output

accurate 50Ω source, and the impedance must not change when the generator is switched on and off. Many published noise generator circuits ignore this precaution. The noise temperatures of many modern preamplifiers (especially GaAsfet types) are extremely sensitive to source impedance, and measurements can be totally falsified by changes in the on/off impedance of the noise source. A suitable diode noise generator is shown in Fig 9. The diode is a transistor base-emitter junction operated in reverse breakdown, the resistor in series with the regulated 5V supply having been selected to maximize the noise output. The on/off impedance change is stabilized by over 30dB of rf attenuation; the rf attenuator arrangement in Fig 9 was optimized at 432MHz with the aid of a home-made return loss bridge (part 1, Fig 6) and its performance was subsequently verified using commercial equipment. Regardless of whether the dc supply is on or off, the noise generator presents a good 50Ω termination up to 432MHz, and is still passable at 1.3GHz. Although its noise temperature is not calibrated, the generator can be used in comparative measurements and for checking system performance. It can also be used with the G4COM noise figure comparator [4] which is highly recommended for aligning front-ends to give the best possible nf.

The problem with all semiconductor noise generators is that they can't be used for absolute measurements until their noise temperatures have been calibrated against some other standard, preferably a hot resistor. Even so, their convenience and repeatability has made semiconductor noise sources the norm in commercial noise generators for vhf, uhf and at least the lower microwave region.

One type of diode noise generator that is often claimed to be self-calibrating is the saturated thermionic diode, whose absolute noise output is theoretically predictable. But this is another example of a traditional method which doesn't work with today's low-noise front-ends. There's a hidden approximation in the normal procedure of measuring the diode current corresponding to a 3dB increase in $(s+n)/n$ ratio, which leads to serious errors with low-noise receivers [5]. Also, although the textbooks take account of the thermal noise from the 50Ω terminating resistor in the diode circuit, they usually assume that the resistor is always at 290K. In fact the resistor sits right next to a thermionic diode in a hot little box, and with a low-noise front-end you could hear that resistor warm up as the measurement session proceeds! Worst of all, the output impedance of most thermionic noise generators varies dramatically between the "on" and "off" states, and I've already mentioned that many modern low-noise amplifiers don't like that. For accurate measurements on modern vhf/uhf front-ends the thermionic diode noise source is no more self-calibrating than a semiconductor source, and a lot less convenient.

To sum up, relative measurements of noise temperature with



uncalibrated noise sources are quite straightforward, given a certain amount of care and basic understanding. But there are no simple methods for absolute measurements. The hot/cold method is probably the most promising for use at home, though even this needs a great deal of care.

Strong-signal (dynamic range) measurements

As I explained in [3], strong off-frequency signals can have several possible effects on receivers. The following tests evaluate the three effects that are of most concern to amateur vhf/uhf operators because of their potential to interfere with weak signals. The three effects are:

- ***Third-order intermodulation**—mixing between at least two strong in-band signals, to give products which are also in-band and can interfere with the wanted signal.
- ***Reciprocal mixing**—raising of the receiver's apparent noise level, due to the noise sidebands of the receiver's own local oscillator.
- ***Gain compression**—when a strong off-frequency signal causes one of the stages in the receiver to limit, suppressing all other signals including the wanted one.

Different levels of strong signals are needed to provoke each of these effects. These levels can each be expressed in decibels above the receiver's noise floor, giving the dynamic range for the overload effect in question [3]. Remember, there is no single definition of dynamic range: a receiver has a separate dynamic range for each overload effect, and thus needs a separate test. Even slight overload could interfere severely with a barely-copyable weak signal. When testing receivers meant for amateur dx working, we usually measure so-called "spurious-free dynamic ranges", which relate to the situation where the particular overload effect just begins to be noticeable.

Strong-signal sources

Strong-signal tests require signal sources capable of delivering cw carriers at known power levels of several milliwatts, with low levels of spurious signals including noise sidebands. For gain compression measurements on modern front-ends the level of the single-tone test signal needs to be variable up to about 0dBm (1mW). A power level of about -30dBm is required to test for reciprocal mixing—and many present-day commercial vhf/uhf receivers are in deep trouble with test signals of much lower power!

Home-built signal sources for vhf and above need to be crystal-controlled, and designs for low-noise crystal oscillators are available. Fig 10 is a typical example of a low-noise oscillator for the frequencies in which we are interested [6]. The oscillator is based on a fet cascode amplifier with positive feedback through the pi-network C10-L2-C11. The overtone crystal bypasses the source of TR1 to ground at its series-resonant frequency, producing sufficient loop gain to permit crystal-controlled oscillation. The active devices in most oscillator circuits not only provide gain but also limit the amplitude of the oscillations, so the devices have to operate in a non-linear mode. This can lead to increased levels of noise sidebands. In the circuit of Fig 10 the amplifying and limiting functions are separated; D1 and D2 do the limiting, allowing TR1 and TR2 to run in linear Class A for lower noise. Other low-noise features include the use of power fets at high bias currents, and the generally high signal levels maintained around the oscillator loop. Note the rf chokes RFC1 and RFC3 in series with RV1 and RV2, the source bias resistors of TR1 and TR3. Without these chokes, RV1 and RV2 would become sources of thermal noise because their resistances are quite well matched to the circuit impedances prevailing at these points. (I'm not so sure about RFC2, though, because the low input impedance of TR3 swamps the gate impedance of TR1 and produces a good mismatch to thermal noise generated in 100kΩ resistor R3.) Constructional and setting-up details for this oscillator are given in [6].

A low-noise oscillator deserves low-noise amplifiers and frequency multipliers. The amplifier TR3 in Fig 10 is a power fet, running at high current in Class A. Higher-level amplifiers can also use power fets, or bipolar vhf/uhf power transistors [7], which should be

Fig 10. A low-noise crystal oscillator for 96MHz. The circuit is adaptable to 72MHz ($\times 2 = 144$ MHz) or 100MHz ($\times 4 = 432$ MHz). For details see [6]. D1, 2: Schottky diodes. TR1, 2, 3: P8000 power fets (or U310 at $I_d = 20$ mA). X1: 96MHz. L1: to resonate at 96MHz with X1. L2: 6 turns, 1mm diameter wire on 6mm diameter former, centre-tapped. L3: as L2, no tap.

operated in Class A and considerably below their normal rf output ratings. Strong-signal sources for 50MHz and 70MHz can use overtone oscillators directly on those frequencies; while sources for the higher bands require frequency multipliers. Multipliers have to be non-linear, or else they wouldn't work, but the operating conditions of ordinary transistor multipliers are very vague indeed, making it hard to design for low-noise performance as well as reasonable efficiency. Avoid high-order multiplication in a single stage; frequency-double if you can, double if you must, but nothing higher. Thus a 144MHz source requires an oscillator on 72MHz followed by a doubler (overall, this will probably be easier, cheaper and better than going for an oscillator on 144MHz direct), and 432MHz requires a 108MHz oscillator and two doublers. Following my own logic, a 1.296GHz source requires an 81MHz oscillator and four doublers, though I haven't tried it and frankly I'd be tempted to cut corners and frequency-treble at least once.

A frequency-doubling technique worth exploring is the balanced-diode circuit [8]. If the circuit in Fig 11 looks like a refugee from a power supply, that's because it actually is a full-wave rectifier. Remember how 50Hz mains input is converted into 100Hz ripple on the smoothed dc? In Fig 11 we apply an rf input at frequency f through a suitable centre-tapped transformer, let the dc output run away to ground, and use the rf ripple. This is mostly at the doubled frequency $2f$, because the balanced arrangement tends to cancel out the neighbouring frequencies, f and $3f$. A single tuned circuit is enough to give a very pure output at $2f$. The diodes should be fast Schottky switching types for vhf/uhf, and for low noise and good doubling efficiency they need to be driven hard so they can't dither in partial conduction. Diode multipliers are passive, so they need a Class A amplifier at the output frequency to make up the loss in the diode circuit [8]. Comparing a diode multiplier chain with a conventional chain using transistor multipliers, you need about the same number of transistors, and you also need the diodes and their transformers. But diode multipliers don't need double-tuned circuits, and they give you a far better chance of obtaining low noise and good spectral purity without special setting-up. It's very satisfying to carefully design something, build it at home, tune it up "blind", and then take it into a lab and find it really is good!

Intermodulation measurements

Intermodulation requires at least two strong signals, so a test for intermodulation performance requires two separate signals fed into the receiver input. For accurate results, the only source of intermodulation between these two signals must be the actual receiver under test. This is tricky: somehow you have to bring the two signals together without letting them intermodulate. Intermodulation could occur in any non-linear components outside the receiver—most notably in the output amplifiers of the signal generators themselves, where signal levels are the highest. So the two signal generators need to be isolated from each other, by in-line attenuators plus a special hybrid combiner to add the two signals while keeping the sources isolated. Another attenuator after the combiner varies the level of the two-tone test signal. The basic test setup is shown in Fig 12, and more details are given in the references [7,9].

For measurements on modern vhf/nhf front-ends, the level of the two-tone test signal needs to be variable up to about -40dBm , with incidental intermodulation products suppressed by more than 60dB . (It is conventional to quote the levels of intermodulation products against the power level of one of the two equal test signals, rather than the sum.) Since the output of each signal generator has to pass through a high-value attenuator plus another variable attenuator after the combiner, each generator must provide an initial output of at least $+10\text{dBm}$. This means making two high-level low-noise signal sources following the guidelines I gave earlier. The direct rf signal paths are not the only source of intermodulation between two generators. One rf source can modulate the other via leakage along the outside of coaxial cables, or by rf getting in to the dc supply lines. Each signal source must be very carefully screened, and

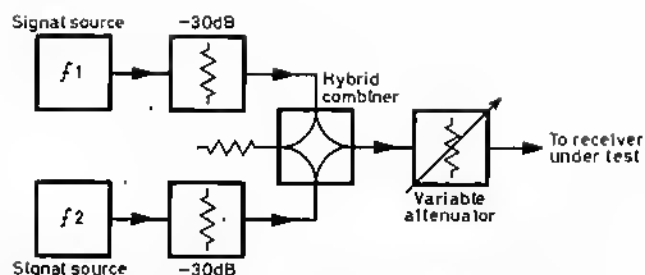


Fig 12. Intermodulation test set-up. Note the precautions to isolate the two signal sources from each other

all dc supplies must be fanatically filtered and shielded; typical precautions include boxes within boxes, each with soldered-up lids, double filtering of dc supplies through screened compartments, and permanently-soldered connections of solid-wall coaxial cable for the high-level signals [7, 9].

Having assembled the whole two-tone test set-up, take it to a convention where someone can put it on a spectrum analyser to check for unwanted intermodulation and to get an absolute calibration for the rf levels. You can calibrate everything by yourself, but why not make use of the facilities available? The people who run the test benches at conventions will be pleased to help—you'll be a welcome change from the procession of black boxes!

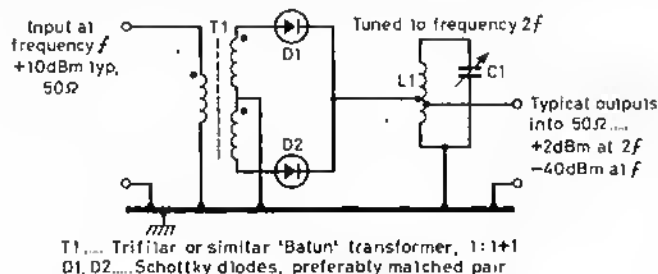
Conclusion

With the home-made test equipment I have described, you can make all the necessary tests and measurements on modern vhf/nhf receiver front-ends. Simple relative measurements may be all you need to optimize front-end performance, and to check that it stays that way. Beyond that, absolute measurements can be made with all the accuracy we need in amateur radio. It will take you longer than the person using professional test gear, but with care and understanding you can get good results.

What really matters is getting the best possible on-the-air performance from your receiver. Any measurement—no matter how simple—is better than guesswork and wishful thinking!

References and notes

- [1] A common source of errors in measurements on receivers that have no front-panel age on/off switch is to try to work with signal levels below the age threshold, merely to save having to delve inside the set to disable the age. Even if the S-meter needle does not move, the age may still be operating on noise peaks, and your measurements will be useless and misleading.
- [2] *Solid State Design for the Radio Amateur*, Wes Hayward, W7ZOI, and Dong DeMaw, W1FB (ARRL), p168. The response of this meter is proportional to the signal voltage (not power as in a square-law detector). The -3dB and -10dB presets can be calibrated by calculation from the meter scale, or by using fixed attenuators in a 50ohm audio system.
- [3] "Modern vhf/nhf front-end design", Ian White, G3SEK, *Rad Com* April-July 1985, pp264, 367, 445, 537.
- [4] "An alignment aid for vhf receivers", J R Compton, G4COM, *Ryd Com*, June 1976, p36.
- [5] The traditional method of measuring nf with a thermionic noise diode is to measure the diode current corresponding to a 3dB rise in $(s+n)/n$ ratio. The noise power from the generator is then taken to equal the receiver's own noise-floor power level. But this is only true in the absence of other noise sources. The resistive output circuit of the noise or signal generator has a noise temperature of its own, so its thermal noise will add to that of the receiver and will tend to mask any changes in the true $(s+n)/n$ ratio. Thus the traditional "3dB" thermionic diode technique is not accurate for low-noise front-ends; it would need to be entirely reworked in terms of noise temperature.
- [6] "An extremely low-noise 96MHz crystal oscillator for nhf/shf applications", B Neubig, DK1AG, *VHF Communications*, winter 1981.
- [7] "A two-tone test generator for the two metre band", M Ploetz, DL7YC, in *VHF/UHF Technik* (Berliner DUBUS Gruppe, 1978). *UHF-Unterlage Teil 3*, ed K Weiner, DJ9HO (in German) contains designs for both 144MHz and 432MHz.
- [8] *Solid State Design for the Radio Amateur* (see [2]), p197. The bipolar feedback amplifiers shown following the diode doublers are not suitable for uhf. Other more suitable vhf/uhf high-level, low-noise, Class A amplifiers may be substituted.
- [9] "Intermodulation measurement techniques in mixers and amplifiers", P E Chudwick, Application Note AN1009, Plessey Semiconductors Ltd.



T1... Trifilar or similar 'Baton' transformer, 1:1:1
D1, D2... Schottky diodes, preferably matched pair

Fig 11. Balanced-diode frequency multiplier for vhf/uhf [8]

A SIMPLISTIC APPROACH TO THE DESIGN OF LOW POWER OUTPUT STAGES FOR CW TRANSMITTERS

Derek Guy, G3IBH*

THIS ARTICLE describes a design methodology which I have used successfully to design driver and power amplifier stages for 1.8 and 3.5MHz up to about 3W using transistors not specifically intended for this application. An example is included for a 2W driver/pa system for 1.8MHz.

The problem

The principles surrounding the use of transistors as pa stages are well described [1], but generally assume the use of transistors designed specifically for high-power rf use and for which full performance data are available. These transistors are expensive, and a much cheaper alternative for low-power use is the "ordinary" small power transistor (eg the BFY50 range). The snag is that the data sheets, although comprehensive, do not provide enough data (particularly of input impedance and power gain) to enable easy design of rf power stages.

The following methodology has been derived over several years and, though simplistic in its approach, has resulted in good, predictable designs using the BFY50 series of transistors. There is no reason why the methodology should not be used with other small power transistors.

The hypothesis

The design methodology is based on the following simplistic hypothesis:

(a) Assuming that $V_{b-e} = V_{cc}$ (Class B or C only)

$$R_c = V_{cc}^2 / 2W_o$$

$$\text{and } I_{c(pk)} = V_{cc} / R_c$$

where R_c = collector dynamic load

V_{cc} = supply voltage

W_o = required rms output power

$I_{c(pk)}$ = peak collector current.

(b) $I_{b(pk)} = I_{c(pk)} / B$

and, assuming $V_{b-e(pk)} = 1V$,

$$R_b = 1 / I_{b(pk)}$$

$$= B / I_{c(pk)} \dots \dots \dots (1)$$

where $I_{b(pk)}$ = peak base current

$V_{b-e(pk)}$ = peak base-emitter voltage for $I_{b(pk)}$

B = transistor common-emitter current gain at the operating frequency

R_b = transistor input resistance.

The assumption in (b) that $V_{b-e(pk)} = 1V$ is an arithmetic convenience. In practice, (see Fig 1) V_{b-e} will be something greater than 0.7V for a silicon transistor and will not be far off 1V at the level of collector current being considered. Also, the assumption that $R_b = V_b / I_b$ is not strictly correct, since the base-emitter junction is non-linear and only conducts for part of each half cycle. However, my hypothesis is that R_b will not be less than this value, and the driver is designed to drive both the base resistor and R_b .

(c) The peak power required to drive $I_{b(pk)}$ into R_b ,

$$W_{b(pk)} = I_{b(pk)}^2 R_b$$

$$= I_{c(pk)}^2 / B^2 \times B / I_{c(pk)}$$

$$= I_{c(pk)} / B \dots \dots \dots (2)$$

The rms power required is half this value, by designing the drive circuit to deliver an rms power equal to $W_{b(pk)}$, and shunting the base-emitter junction with a resistor equal to R_b , ensures that there is adequate power to feed both the resistor and the transistor. The inclusion of the resistor results in a more constant load on the driver.

The above hypothesis results in two straightforward equations (1 and 2) for deriving pa input resistance and driving power. Again, these are:

$$R_b = B / I_{c(pk)}$$

$$W_b = I_{c(pk)} / B$$

It should be emphasized that while they are suitable for experimental purposes, both of these expressions are extremely approximate.

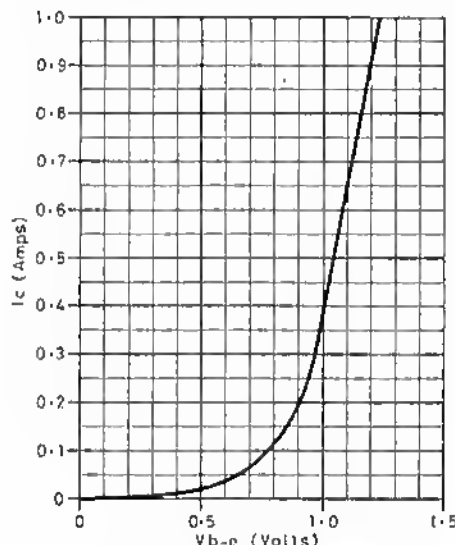


Fig 1. Typical I_c/V_{b-e} curve for BFY50

Design methodology

The steps involved in designing a pa and driver are therefore as follows:

1. Assuming 66 per cent efficiency, choose a transistor capable of dissipating half the power output required. The device should have a cut-off frequency (f_t) of at least 10 times the operating frequency, and a $V_{c-e(max)}$ at least twice the supply voltage.
2. Calculate R_c and $I_{c(pk)}$
3. Design the pa tank circuit to match the transistor to the load with appropriate Q.
4. Calculate R_b and driver power.
5. Design the driver tank circuit to match the transistor to the pa input with appropriate Q.

Worked example

As an example, let us consider the design of a driver and pa system of 2W output for 1.8MHz to run off a 12V supply.

1. Choose a transistor with an f_t of at least 20MHz which has a $V_{c-e(max)}$ of at least 24V capable of dissipating 1W. The BFY50 fitted with a small heatsink meets this requirement.

2. Calculate R_c and $I_{c(pk)}$

$$R_c = 144 / 4 = 36\Omega$$

$$I_{c(pk)} = 12 / 36 = 0.33A$$

3. Design the pa tank circuit to match to 50 Ω and present 36 Ω to the transistor collector. The arrangement I prefer is a parallel tuned circuit tapped to match to the collector then coupled through a series matching capacitor to the load. There are several other methods but this one (described in Fig 6.86(a) of [1]) is preferred on the basis that it uses one wound component only and capacitors of reasonable size. I have assumed a tank circuit R1 of 2,400 Ω and a Q of 12 at 1.9MHz.

*12 Broadmead, Hitchin, Herts SG4 9LU.

For the benefit of readers without a copy of [1], the appendix shows how to calculate the tuned circuit values.

4. Calculate R_b and driver power assuming a minimum B of 10.

$$R_b = 10/0.33 = 30\Omega$$

$$\text{Driver power} = 0.33/10 = 0.033\text{W}$$

Choose 33Ω base resistor as nearest preferred value.

5. Design driver tank circuit to match to 30Ω and present correct load to the driver. Using the same formula as for the pa, the driver load must be:

$$R_c = 144/0.067 = 2,149\Omega$$

A circuit similar to the pa is used, but because the load to be presented to the driver collector is much higher, a tapped coil is not required and $R_t = R_c$. The values shown are based on a Q of 12 at 1.9MHz.

Fig 2 is a circuit diagram of the completed driver/pa design annotated with the values assumed and calculated above. The series matching capacitors should be set as close as possible to the design values, particularly the pa-to-load capacitor if the required output is to be achieved. The driver would usually be driven by the vfo via a buffer. The power required at the base of this stage will be a few milliwatts, and a simple, untuned emitter follower should be adequate.

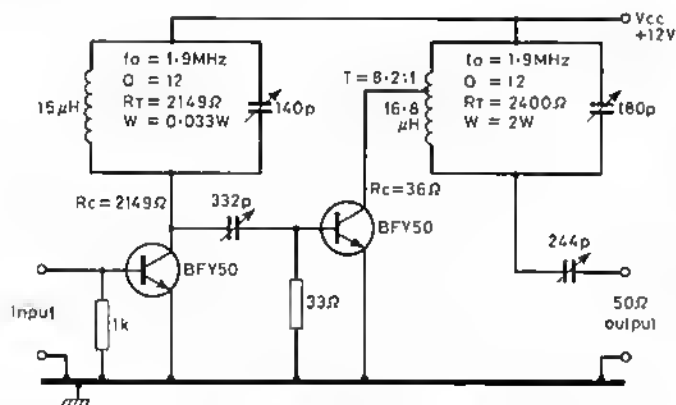


Fig 2. 2W driver/pa system for 1.9MHz

Conclusion

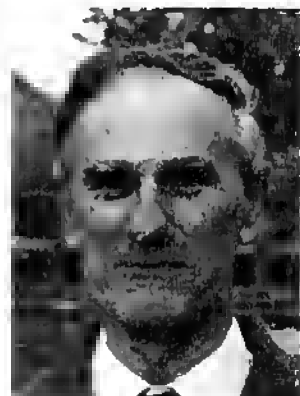
The above method, although it is a bit "rough and ready" in deriving R_b and driver power, is sufficiently accurate for practical purposes and does allow fairly easy design of low-power hf power amplifiers without recourse to complicated mathematics. The method ignores input and output capacitance in the pa, but this is of little consequence at the lower frequencies because these capacitances are swamped by the tuning capacitor.

The resulting design will be a good starting point for further experimental work.

G3IBH was born in 1930 and first became interested in radio at the age of eight when a friend gave him the parts to build a crystal set. After eight years' service in the RAF as a radar technician, he joined the English Electric Co (now British Aerospace) where he has held various appointments in technical, administrative and project management.

He obtained his amateur licence in 1952, operating mainly on 1.8 and 3.5MHz both at home in Eastbourne and at Service locations in the UK. In the late 'fifties, after leaving the RAF, the pressures of a developing professional career and family commitments led him to allow his licence to lapse, but in the early 'seventies his interest was rekindled. After retaking the Morse test and the RAE, G3IBH was re-activated in September 1976 using a 3W home-brew transmitter on 3.5MHz cw.

His main interest now is listening, chiefly on the lower



frequency bands, together with experimental and constructional work (and writing about it). He is also interested in computing (BBC Model B) and the use of computers as an aid to the design of amateur equipment.

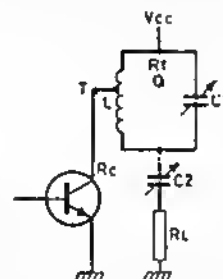
References

[1] *Radio Communication Handbook*, fifth edition, Vol 1, Section 8. RSGB.

[2] Mullard Data Sheet for BFY50.

APPENDIX

(Tank circuit design (from Fig 6.86(a) of [1])



$$R_c = V_{cc}^2 / 2W_o \quad T (\text{turns ratio}) = \sqrt{R_t / R_L}$$

$$X_1 = R_t / Q$$

$$X_{L2} = R_L \sqrt{R_t / R_L - 1}$$

$$X_{C1} = \frac{R_t}{Q} \left[\frac{1}{1 - X_{L2} / Q R_t} \right]$$

$$L = X_1 / 2\pi f$$

$$C = 1 / 2\pi f X_c$$

R_t (tank circuit dynamic resistance at resonance) should be at least 1,000Ω to avoid unreasonably large values of capacitance. Q should be about 12 as a compromise between selectivity (hence harmonic rejection) and tuned circuit losses.

RSGB National Amateur Radio Convention – 28-29 March 1987

HOME CONSTRUCTORS COMPETITION

PRIZE

The winner will receive the Horace Freeman Trophy and a cash prize of £100.

RULES

1. The equipment must be an original design for use in the amateur station.
2. The item shall be capable of reproduction at home without the use of professional facilities.
3. In the opinion of the Judges, the cost of the materials required to make the equipment must not exceed £50.
4. The competitors must be members of the RSGB.
5. At the request of the Society, the winner will either prepare an article on his/her entry or supply the necessary data from which an article can be written, for possible publication in *Radio Communication*, for which the usual payment will be made.
6. Entry forms can be obtained from the membership services department at RSGB HQ, or from the organiser's office at the convention. The entry, together with the completed form, must be handed in to the organiser's office at the convention by 3pm on Saturday 28 March 1987.
7. Entries will be judged by the chairman of the RSGB Education Committee or his deputy, with appropriate advice. Their decision on who shall receive the award, or whether to withhold the award if entries are of inadequate standard, shall be final.

Technical Topics

by Pat Hawker, G3VA

Exactly 50 years ago, on 2 November, 1936, the world's first regular public service of high-definition (then 240 and 405 lines) television broadcasting began from Alexandra Palace, London. A few weeks before, as a schoolboy, I was one of the 100,000 visitors to the 1936 Radiolympia who had filed past an anonymous display of small tv screens that accorded a preview of the new novelty, infinitely superior to the earlier 30-line all-mechanical system.

TV was a slow starter with 10in and 12in sets costing almost as much as a small car. Only 2,000 sets were sold in the first 18 months of the service, later perking up to reach a bare 20,000 by 1 September, 1939 when the BBC service closed for the duration of the war.

Within a matter of weeks of the opening of Ally Pally, the late H A M Clark, G6OT, was writing in the *T&R Bulletin* (forerunner of *Radio Communication*) on cures for interference to television arising from the third harmonic of amateur 14MHz transmitters. Unfortunately, tv is a problem that has never really gone away, although today in the UK the more serious emic problems are often concerned with other forms of consumer electronics and domestic appliances.

TV broadcasting created enormous demand for vhf, uhf and shf spectrum. Yet, despite the problems it brought to amateur radio, it has always for most of us been a love-hate relationship. For a considerable number of us it has even paid our salaries! Together with radar (rdf, radiolocation) it brought about the mass-production of components, valves, cathode-ray tubes and, later, solidstate devices suitable for use above 30MHz. So if sometimes we wish our neighbours were not so obsessed by the one-eyed monster, and that set makers would do more to give their products better immunity (see below), we can still wish tv a happy anniversary and admit that it was an invention that changed the world.

The old enemy—tv

Interference to television receivers arising from radiated spurious signals on or near the frequency of the tv channels is far less common in the UK, with its uhf tv, than problems arising from breakthrough of strong local signals at frequencies far removed from those used by tv. The UK problem is essentially one of strong signals driving one or more of the tv receiver stages into non-linearity. UK amateurs, faced with a tv or bcj problem would be well advised to obtain a free copy of the DTI's useful 28-page booklet "How to improve television and radio reception" (which should be obtainable from main Post Offices).

In the USA, with both vhf and uhf tv channels, work is continuing on investigating emic problems that arise from signals on similar, or roughly similar frequencies, to the wanted tv channel. There is for example, a specific problem (for which amateurs are in no way responsible) that arises with vhf tv Channel 6 (vision carrier 83.25MHz, sound carrier 87.75MHz) and the educational shf/fm radio stations which use 88 to 92MHz. Apparently, in many parts of the USA these two services have "been battling for years for supremacy on tv screens" according to a paper by L H Hoke of NAP (North American Philips) in *IEEE Trans on Consumer Electronics* (Vol CE-32, No 3, August 1986, pp290-294). In other words, the radio broadcasts cause patterning on tv screens on Channel 6. Of interest to UK amateurs is that this problem—plus the American decision to allow the land-mobile radio service to share parts of the uhf tv spectrum with tv, subject to various constraints—is leading to detailed investigation of the various interference mechanisms, the effect of the strength of the desired and undesired signals, the use of varactors in tv tuners, and the ways in which tv receivers might be made less vulnerable to unwanted rf signals.

The next paper in the same issue of the *IEEE Trans*, "Interference problems in proposed spectrum sharing between fm land mobile radio and

uhf television" by Jouke Rypkema of Zenith Electric (pp 295-299), bears this out. Rypkema notes the large spread in performance measured on different tv receivers, and suggests that "many receivers could be improved if manufacturers fully understood the reasons for performance differences and were to invest the time and money to improve designs". He provides a detailed mathematical analysis of the effects of non-linearity, including intermodulation products and other spurious responses. His suggestions for reducing susceptibility to out-of-band signals include:

(a) Reduction in second harmonic content of the local oscillator to improve the rejection of signals at half-i.f.

(b) Balanced mixer design directed at reducing interference mechanisms.

(c) Development of higher-Q varactor diodes with adequate capacitance ratio and tight tracking tolerances to improve pre-mixer selectivity.

In connection with (c) many American uhf tuners still use variable-capacitance tuning and have no signal-frequency rf amplifier. This results in poor weak-signal performance (in the USA uhf tv is regarded as less important than vhf tv) but such tuners tend to have significantly better strong-signal performance in terms of dynamic range than varactor-type tuners.

Hoke puts emphasis on improvement of video detectors in which much of the Channel 6 / fm-radio interference is generated, noting that "the balanced multiplier circuit which makes up the synchronous or quasi-synchronous video detector in most currently available i.f. detector ic devices produces a much lower level of beat products than the older conventional diode detector. The internal balance of the multiplier is a critical parameter in lowering the cross-modulation product generated in this stage".

For the future, he notes that several devices and circuit concepts are being developed which may yield further improvement to a tv's ability to reject interference from fm signals. These include:

- (1) Improved saw (surface acoustic wave) i.f. filters with lower out-of-band ripple. Some current saw filters have out-of-band lobes as high as -40dB from picture-carrier level while others have no lobes higher than -50dB.
- (2) Adoption of double-balanced mixer techniques to improve dynamic range (although prototype designs by Texas Instruments were developed in the 'seventies using mesfets and double-balanced mixers, these ideas have never been put into production by the set-makers).
- (3) Double rather than single conversion front-ends to improve selectivity, while ic devices providing this at low cost.

Suggestion (3) may seem surprising since for communications receivers designed for wide dynamic range and absence of spurious responses it is generally assumed the few conversions the better. In this case it seems to be a question of achieving better selectivity characteristics and so rejecting signals in adjacent or nearly adjacent channels.

Of course, there is not much that we as radio amateurs can do to lessen the susceptibility of neighbours' tv sets except by the addition of external filters. Nevertheless, it is worth keeping an eye on all such investigations. Who knows, we might persuade the DTI and BREMA that tv sets could be made much more immune to unwanted signals than the current models!

Military manpack with bilateral amplifiers

Fig 3 of the September *TT* showed a block diagram of the Plessey PTR5300 taken from the paper presented at the IERE receiver conference last July. However, as the author of the paper, D Holman, points out, the diagram was misleadingly captioned since this was the "before modification" version. The later substitution of the reversible amplifier described in *TT* eliminated eight relays and four amplifiers. He sends along the diagram (Fig 1) of the modified version (not in the original paper) and this gives a clear indication of the useful simplification made possible by adopting the

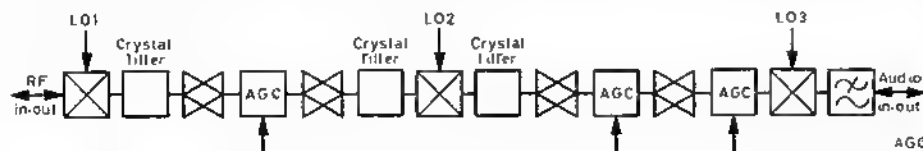


Fig 1. This is the block diagram of the modified Plessey PTR5300 military hf manpack transceiver fitted with the reversible amplifiers described in the September *TT*. This diagram should be compared with the September Fig 3 which was the original version requiring eight relays and four more amplifier stages.

bilateral amplifiers. This diagram should be compared with Fig 3 of the September issue.

He adds: "With regard to my 'manpack as unwanted junk' phrase, I admit to some hyperbole, but of course the intention was to draw the attention to us lovers of knob widdling to the fact that not everyone shares our delights, especially when there is a rather more urgent task in hand (survival). I like to imagine the Consumers Association carrying out a test on hf transceivers as they might do for a dishwasher—after all, not many of us have a craving for washing dishes!"

Project 6L6 and the pi-tank

Impedance transforming networks such as the pi, L and T networks have long formed the basis of antenna tuning units and rf coupling circuits. The pi network with its three circuit elements was first introduced to radio amateurs in the form of the "Collins universal coupler" by Arthur Collins, W0CXX, founder of Collins Radio in the 'thirties, in both balanced and unbalanced versions. To the best of my knowledge the first person to conceive and put into practice the idea of using the pi-network as an unbalanced output circuit for the final stage of a transmitter was John Brown, G3EUR. This was for the 3 Mk1 (ie "B-1") SOE suitcase transmitter of 1941-2, which used a single 6L6G power crystal-oscillator and was the predecessor of the well-known two-stage (EL32co-6L6Gpa) 3 Mk2 (ie "B-2") suitcase transmitter of 1943-4 which similarly used the pi network.

G3EUR tells me that his 1941 "Project 6L6" drew upon the 1939 "Run 60" QST design (see 77 May 1986, Fig 2) but with the use of a pi-output matching arrangement to permit the transmitter to be used effectively with random-length (ie non-resonant) antennas.

He still believes that the B-1 arrangement (Fig 2) represents the most versatile one-valve transmitter, always provided that the crystals used are capable of handling up to about 50mA of current without cracking or mode-jumping. As an experiment he has run a B-1 from an 800V (key-up) power supply unit and obtained 50W cw output.

It should, however, not be forgotten that power oscillators generate considerable harmonic output. A pi-tank may help reduce this, but additional emc precautions are likely to be needed even if such a rig does not actually cause any interference to hf television. You don't want replies on 14, 21 or 28MHz from your 7MHz "CQ" calls!

Universal interference suppressor?

How many times have you cursed when a loud interfering signal has suddenly appeared right on top of the station you are working or listening to? Most of us have learned to accept such situations as an inevitable part of amateur radio, but the professionals, particularly those concerned with military (C/I) communications, regard them as a technical challenge which needs to be overcome. In these days of "electronic warfare" they face the problem of intentional jamming in the form of electronic counter measures (ecm). Techniques for receiving a weaker wanted signal from under strong interference are becoming a recognized part of electronic counter-counter-measures (eccm).

Certainly various approaches are possible, some already well known. A good directional receiving antenna can place a deep null in the direction of the unwanted signal provided always that this is not arriving along the same bearing as the wanted signal. The frame or ferrite-rod antennas despite (or perhaps because of) their simplicity, can be very effective—particularly at the lower mf/hf region of the spectrum—manually steering the nulls by rotating the antenna for maximum rejection of the unwanted signals. It is also perhaps worth remembering that frame antennas are less susceptible to local electrical interference than conventional antennas.

Slightly up the scale of complexity is the technique of phasing out an interfering signal by using two separate antennas with the aid of an electronic steering control box placed ahead of the receiver (see 77 August 1982, pp684-5 or QST October 1982, pp28-32). A much more sophisticated form of electronic steering of rejection nulls is possible with computer-type adaptive arrays, though these are not exactly within amateur budgets! A lot of work is going on at the moment in devising systems that automatically identify wanted or unwanted signals by their modulation and other characteristics, and it would be feasible to hitch these up to either automatic d/f systems or automatic null-steering arrays.

But is there anything that could be done once the unwanted interference on the same frequency as the wanted signal has actually got into the signal path of the receiver? Apparently the answer, in some circumstances, could be yes. This would involve the use of notch-filter and signal-cancellation techniques, and would apply to signals on exactly the same frequency that no degree of receiver selectivity could separate and to signals arriving from precisely the same bearing, so defeating even the most sophisticated forms of electronic null steering.

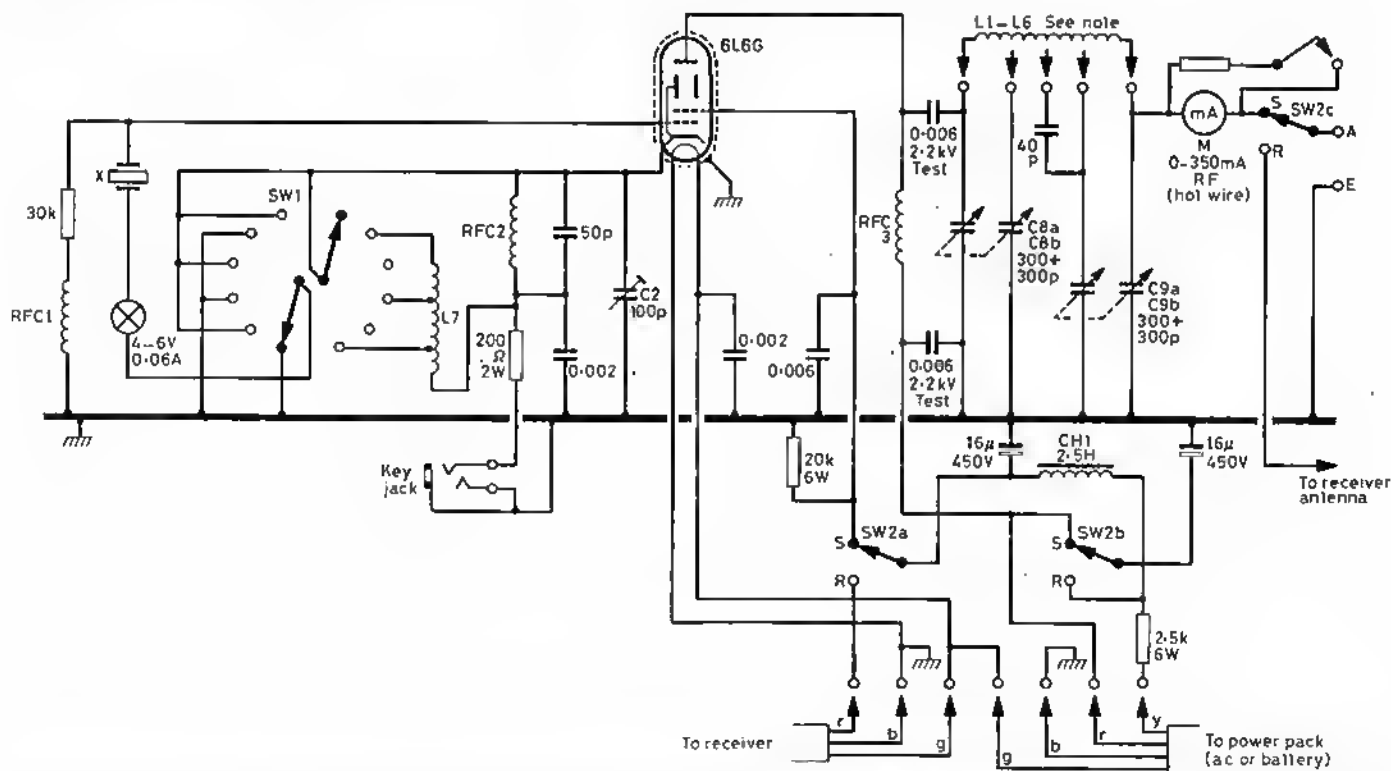


Fig 2. Circuit diagram of the single-stage 6L6G transmitter that formed part of SOE's 1941 Type 3 Mk1 ("B-1") suitcase transmitter-receiver designed by John Brown, G3EUR, and believed to be the first time that a pi-network was used as a transmitter tank circuit rather than as an antenna coupler. Operated from a 400V psu it provided an output on the crystal fundamental frequency of 14 to 18W and 12 to 14W harmonic in the titel configuration. Plug-in tank coils with a coil reversing arrangement covered 3.5 to 16MHz. Switch 1 was for 3.5 to 4.4MHz crystals in position 1. Harmonic output in position 2, 4.4 to 5.8MHz fundamentals in position 3; harmonic output in position 4; 5.8 to 8MHz crystals in position 5; and harmonic output in position 6. C8b/C9b are brought in on the lower bands by reversing the coil. Component values were those used before the days of "pietered" values

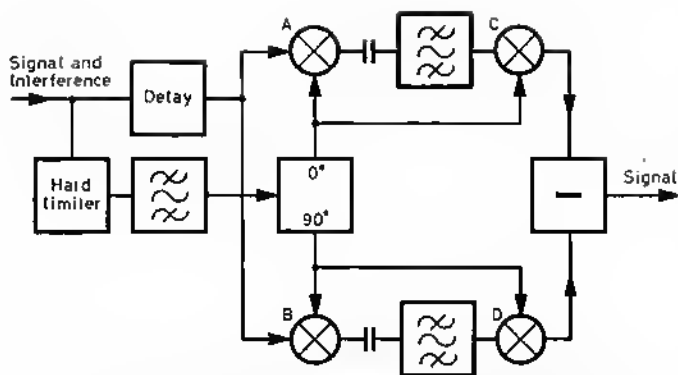


Fig 3. Universal interference suppressor as outlined by J H Roberts of Plessey at the recent IERE Radio Receivers Conference

At the recent Bangor radio receivers conference (see *TT* September), J H Roberts of Plessey presented a paper "A survey of receiver designs for interference suppression". In this he outlined, among other techniques, a "universal interference suppressor" technique that looks very promising. It was claimed that, under favourable circumstances, the system can reduce the unwanted components of the *stronger* of two incoming signals by as much as 50 to 60dB, permitting the weaker wanted signal to be received.

Fig 3 shows the basic idea. The incoming "signal plus interference" is directed along two paths (at i.f.), one of which includes a hard limiter. This has the effect (as for the well-known "capture effect" of FM) of greatly suppressing the weaker (wanted) signal. We then have two paths; one still carrying "signal plus interference", the other virtually "interference only". It is then possible in this arrangement to notch out the interference components by combining the two signals in such a manner that they are of similar amplitude and 180° out-of-phase. The unwanted interference components cancel out and we are left with the wanted signal, previously many decibels under the interference! It sounds almost too good to be true. I suspect that in practice it may not be as easy as might appear from Fig 3.

The system is intended for such applications as ecent for military vhf and uhf (fm) networks, but if the "universal" tag means anything, it should mean that the technique should be applicable in other circumstances. There would clearly be additional problems in using such an arrangement for hf sky-wave reception, where fading might well mean that the wanted signal might alternatively be weaker or stronger than the interference signal. Nevertheless, it all seems an idea worth keeping an eye on, since the circuit elements could probably be put on one or two chips.

Zener protection for relay switching

Peter Hart, G3SIX, provides information on an improved way of preventing damage from the large back-emf generated when a circuit containing an inductor is suddenly interrupted, as for example during relay switching. He writes:

"When the current through a relay winding (or any inductor for that matter) is suddenly interrupted, a large back-emf is generated which can be well in excess of 1,000V for even a small relay. For a relay switched by a transistor, avalanche breakdown at the collector normally occurs, limiting the voltage to a lower level. This is undesirable and can damage the transistor (and even the relay winding). A common cure is to connect a diode across the relay winding to clamp the back-emf. This is effective but noticeably degrades the drop-out speed of the relay. This can be important in such applications as cw keyers. The effect is due to the current which continues to flow through the winding and diode until the stored energy in the inductance of the winding is dissipated.

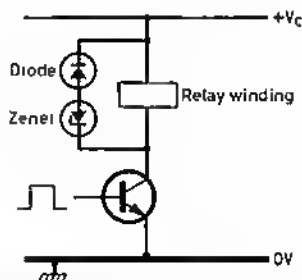


Fig 4. The use of a zener plus diode to reduce back-emf during relay switching results in faster drop-out times than when only a diode is used

"Alternatively, a capacitor can be placed across the winding to limit the peaks to a lower level, but this can degrade the pull-in time of the relay where the driver transistor is unable to supply the high peak charging current of the capacitor.

"A simple solution is to limit the back emf to a suitably low level but not to clip completely. This can be done by adding a zener diode as shown in Fig 4. An ordinary diode is required to prevent forward conduction of the zener when the relay is energized. Experiments conducted on a commonly-used small Vailey plug-in relay with four-pole changeover contacts and 12V 185Ω winding gave the following results when used with a 12V supply:

Damping	Peak volts	Pull-in time	Drop-out time
None	800V	7ms	2ms
Diode only	12V	7ms	10ms
Diode + 10V zener	22V	7ms	4ms
Diode + 22V zener	34V	7ms	3ms
Diode + 33V zener	45V	7ms	2.5ms
1μF capacitor	45V	6ms	3ms

"In circumstances where switching speed is important, it is vital to ensure that the drive voltage does not drop below the rated voltage of the relay winding. For the Vailey relay, reducing the voltage from 12 to 9V doubled the pull-in time to 14ms. However, increasing the voltage to 16V reduced the pull-in time by only a small amount to 5ms."

Electricity, burns and snake bites

In previous items on safety in the shack, I have recalled the old adage that "it's volts that jolts but mills (mA) that kills". In *TT* (January 1985, pp32-3) it was noted that the risk of death by electrocution relates largely to the current passing through the body in the region of the heart and whether this is over a period long enough to cause "fibrillation". This condition is where the heart is caused to malfunction, reducing or stopping the circulation of the blood. Such a condition very quickly causes permanent brain damage, if not death. Removal of the current does not automatically cause the heart to return to its normal rhythm, and sophisticated medical attention is required quickly. It was noted that the IEC has attempted to relate the danger to the current and time, and defined five "zones" of increasing danger (Fig 3 in *TT* January 1985).

However, there is another type of fatal or near-fatal accident involving heavy currents not passing through the cardiac region but resulting in severe burns. It has been noted in the USA that many of those admitted to hospitals with electrical burns do not survive, and those that do often face a life of severe disability due to the loss of one or more limbs.

Martin Atherton, G3ZAY, has drawn my attention to an article in *The MIT Report* (June 1986, pp5-6). As the result of work by Professor Raphael Lee of Massachusetts Institute of Technology (MIT) the article suggests that thermal injury may not be solely responsible for the tissue destruction that often follows such burns. He believes that there may also be a nonthermal component related to the electrical stress imposed on the cells.

On admission to hospital the victim usually exhibits obvious burns, but during the next few days more and more tissue dies and the victim often ends up with divitalized muscle surrounded by viable connective tissue. This is not at all typical of non-electrical burns.

Dr Lee believes that the problem may arise from the effect of large current pulses rupturing the plasma membrane of the cells. If this proves to be the case, it might be possible to save the cells if they can be kept alive (possibly by drugs) long enough for natural repair mechanisms to come into play.

While this is still to some extent speculative, and probably more applicable to industrial electrical accidents than any possible risks in the shack, it is worth remembering that there are hundreds of such accidents each year, with linemen, firemen, policemen etc at most risk.

There is always something new to learn about electricity and its effects on the human body. In the early years of the century, it was still widely believed that high-voltage, low-current electrical shocks could result in cures for many forms of ill-health. Shocking coils (vibrator unit with step-up transformer) running from batteries were widely sold for such purposes, though in later years became little more than the "toys" still around when I was a child.

Such treatment fell into disrepute long-ago although, in extreme form, surviving in the controversial electro-convulsive treatment for severe depression. However, a recent report in *The Lancet* (26 July, 1986) describes a series of most successful experiments in using high-voltage, low-current dc pulses for treating people bitten by venomous snakes in the eastern Amazon jungle of Ecuador, where some four per cent of all deaths are due to snakebite and where more than half of all adult males have been bitten more than once.

In 34 cases dc pulses of 20-25kV at under 1mA were applied to the site of snake bites within 30min of the bite; in 10-15min after such treatment

all pain had gone and none of the usual after-effects developed. Most of the patients, all of whom survived, were able to go home after an hour. Seven people who refused the electric shock treatment showed the classic complications, and two required life-saving amputations. A small portable unit operating from a 9V battery is now being developed.

While there are not many expeditions to the Amazon jungle, an interesting sideline is that this form of electrical treatment appears to be equally effective in dealing with bee stings and insect bites. Indeed, the work followed a report in a local American newspaper that an Illinois farmer who was hyperallergic to bee stings had found that applying such dc pulses to the site of his bee stings prevented his usually severe reactions from developing. The international medical team that worked in South America included a member of the London School of Hygiene & Tropical Medicine.

Hands-free mobile microphone

The warning in the July *TT* that the next edition of the *Highway Code* is likely to include a specific recommendation that handheld microphones should not be used in vehicles while driving, has prompted Derek Haden, G4WXN, to send along some details of a low-cost but effective mobile microphone.

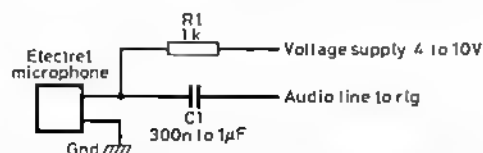


Fig 5. Basic arrangement of electret mobile microphone used by G4WXN

Heart of the system is an electret microphone module available in the Tandy stores at less than £1. Only a few other components are required: R1 and C1 as shown in Fig 5. These are soldered onto a small piece of Veroboard and mounted in a small plastic box together with a switch for ptt operation (and battery if necessary). About 2m of audio coaxial cable is used to connect the microphone insert to the Veroboard via a small hole in the box (alternatively plugs and sockets to choice could be used). The connections to the back of the microphone should be made carefully to avoid damaging it. The connections can then be covered and made to look neat and professional by the use of the outer case of a phone plug (preferably a plastic one as this will have some flexibility). The microphone will be found to be virtually the same size as the open end of the plug cover, providing a good push fit. Connections out of the box to the rig can be soldered to the Veroboard, and then taken out of the box to a suitable microphone plug. As can be seen from Fig 5, the electret microphone requires a suitable voltage to be applied, from about 4 to 10V. Many mobile transceivers provide a stabilized voltage output for accessories. The Yaesu FT77 has 8V available at the rear of the rig; the FT290R has 5.5V on one pin of the microphone socket. Should such a supply not be available, a small PP3 battery can be used, and in view of the low current requirement should last for a reasonable time. Nominal impedance is about 1,000Ω, which in the vast majority of cases will not require additional impedance matching circuitry.

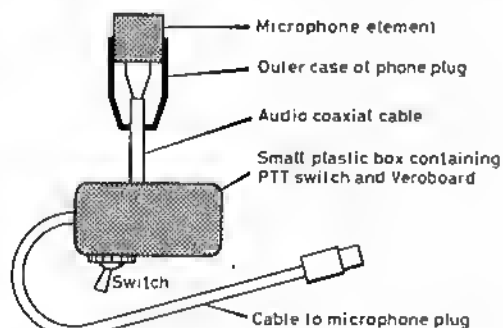


Fig 6. Physical arrangement of the mobile microphone

The microphone can then be attached to the operator via a tie clip or attached to the seat belt of the car or on a boom attached to headphones.

In his own case, G4WXN uses a short length of 5mm plastic hydraulic pipe which is firm but not rigid and can be moulded to shape using a hair dryer so that it forms a halter arrangement which slips loosely around the neck and is fairly inconspicuous. (If suitable pipe cannot be found locally you can contact G4WXN on 0953 607068, evenings).

He has used this microphone arrangement on both an FT290R and FT77

with excellent reports. The microphone is sensitive but does not seem to pick up excessive amounts of background noise.

Non-ionizing radiation levels

The long-standing debate over "safe levels" of human exposure to non-ionizing radiation from transmitting antennas has taken another turn with the issuing during July of new draft proposals by the National Radiological Protection Board (NRPB) in a consultative document. Although their recommendations differ in a number of respects from the now-current American (ANSI) standards, the NRPB follows ANSI practice in recommending lower levels at vhf (30 to 300MHz) where the body tends to act as a half-wave dipole.

In the draft proposals, a distinction is made between "occupational" levels and those to which the general public should be exposed. Both sets of limits are related to a maximum exposure of an average of 5h/day. The recommended public level at vhf is a maximum of 4W/m².

John Rhind, G6JR, in drawing my attention to the new proposals, notes that the public safe limit could be exceeded several metres away from legal-limit high-gain 430 and 144MHz antennas. Since the NRPB now considers that excessive non-ionizing radiation can result not only in thermal effects but also "disruption of behaviour effects", G6JR wonders whether this could account for some of the behaviour noted during high-power contests!

It has been pointed out on a number of occasions that it is not a simple matter to determine the intensity of near-field radiation from vhf, or even more so from hf antennas since these are not in any means the "point sources" used for far-field calculations.

A paper written by a staff member of the FCC in *IEEE Transactions on Broadcasting* Vol BC-31, No 4, December 1985, pages 81-7, shows how the current ANSI limits affect radio broadcasters using medium-wave a.m. or vhf/fm transmitters: see Tables 1 and 2. It includes tables showing for vhf/fm the minimum height above ground for omnidirectional antennas radiating effective radiated powers (erp) from 0.5 to 200kW. For a vhf single dipole antenna and 0.5kW erp there can be a worst-case need for a minimum height of 4.1m. For 3kW erp the worst case height increases to 10m.

For medium waves, the normal broadcast practice is to use a monopole (vertical) antenna with maximum current at ground level. In this case the ANSI safe level is reached, with a 500W transmitter, rather less than 2m from the base of the antenna. At 1kW this becomes 3m; at 2.5kW around 4m; and at 50kW some 12m.

Table 1. ANSI Radio Frequency Protection Guides

Frequency range (MHz)	Electric field strength E ¹ (V/m) ²	Magnetic field strength H ¹ (A/m) ²	Power density (mW/cm ²)
0.3-3	400,000	2.5	100
3-30	4,000 (900/f ²)	0.025 (900/f ²)	900/f ²
30-300	4,000	0.025	1.0
300-1,500	4,000 (1/300)	0.035 (1/300)	1/300
1,500-100,000	20,000	0.125	5.0

Note

1 = frequency in megahertz
E² = electric field squared
H² = magnetic field squared
V²/m² = volts squared per metre squared
A²/m² = amperes squared per metre squared
mW/cm² = milliwatts per centimetre squared

Table 2. Distances (in metres) at which fields from medium-wave stations with monopole antennas are predicted to fall below various electric field strengths

Electric field strength (V/m)	Magnetic field strength (A/m)	Transmitter power (kW)			
		1.00	0.50	0.25	0.10
25	0.06	27	22	18	13
50	0.13	18	14	11	8
75	0.19	13	11	8	6
100	0.25	11	9	7	5
150	0.38	8	6	5	4
200	0.50	7	5	4	3
300	0.75	5	4	3	<2
400	1.00	4	3	<2	<2
500	1.25	3	3	<2	<2
632 (ANSI)	1.58 (ANSI)	3	<2	<2	<2
750	1.88	3	<2	<2	<2
1,000	2.50	<2	<2	<2	<2

Notes: (1) This table can be used for any medium frequency or electrical height. Note that ANSI safe limits decrease between 3 and 30MHz.

(2) The entries in this table apply to both electric field strength and the corresponding magnetic field strength (assuming impedance of free-space equals 400Ω).

Tests carried out near broadcasting stations in Honolulu and Seattle showed that at some points accessible to the public, the ANSI levels were exceeded. ANSI makes no distinction between "occupational" and "public" levels.

High levels of electric field strength (V/m) and magnetic field strength (A/m) near transmitting antennas are clearly unavoidable, though in most cases the effects are confined to domestic appliances in the form of emc problems. I suspect that the years ahead will see increasing concern worldwide about non-ionizing radiation levels in residential areas, with signs that emc problems far from being solved are still exploding.

Frank Harris, G4IEY, draws attention to an item that appeared in some Japanese newspapers last June. Headlined "Electronic smog hangs over society" it reported the imminent establishment by the Japanese Ministry of Posts & Telecommunications of a "council on problems of unnecessary radio waves" that was expected to propose "regulation standards" within the next year. While most of us are anxious to see the UK introduce regulations limiting radio-frequency interference from home computers and similar generators of "electronic smog", it has to be recorded that the Japanese newspaper—in noting a number of accidents and problems that have arisen from lack of emc precautions—included several involving amateur radio transmissions which they appear to include in the category of "unnecessary radio waves". I suspect that the days of "Californian kilowatts" may be drawing to a close.

Low-cost rf switching

I must confess that I have never owned or used a coaxial rf switch, either manual or relay operated, though that has never stopped me from switching coaxial cable feedlines between receiver and transmitter or switching between alternative antennas. The reason is simply that on hf it is not necessary to avoid impedance discontinuities over a few inches (or even feet on the lower frequency bands).

As in so many aspects of current amateur practice, there is a strong tendency, particularly among newcomers, always to do things "by the book". The books rightly stress the importance of avoiding impedance discontinuities at hf and even more so in the microwave region, but seldom mention that below 30MHz there is virtually no likelihood of any swr problems arising in a switch unit. More important than any question of impedance discontinuities is that any switch used in a high-power feedline should be adequately rated for the heavy currents found in 75Ω or 52Ω coaxial cable, even though it is most advisable never to switch rf while power is actually being delivered to the antenna, because of the high-voltage transients generated.

Paul Follini, VEICZX, in *QST* (August 1986, pp25-7) shows clearly that standard domestic wall-toggle change-over switches, rated at about 15A in North America, when mounted in a standard metal enclosure fitted with three SO-239 sockets make perfectly satisfactory rf switches. This is true both for switching an antenna from transmitter to receiver or for selecting one of two antennas, on all bands up to 30MHz, so saving "some bucks" when compared to a pukka coaxial rf switch. His article includes detailed measurements of reflection coefficient and swr versus return loss made on his low-cost switches. These show that any losses or increase in swr are so small as to be quite insignificant.

I must admit to having once run into problems by using switches of relatively low-current rating (1 or 2A) due to accidentally switching with the line carrying rf power. My reason for using these, rather than standard wall switches, is that they are fitted with much longer paddles than most wall switches and this facilitates rapid and easy switching from transmit to receive when using a separate receiver/transmitter; a question that does not arise with transceivers where rf switching is more likely to be used externally only for selecting antennas. This seldom needs to be done frequently or rapidly. Toggle switches are better than rotary switches for this type of application.

A letter from David Jones, N4JED, in *QST* (July 1986, p 43) warns against using coaxial switches as a lightning protection switch. He writes:

"Not only is it not a lightning protector, it can create a direct path for lightning through your ham gear into the house electrical wiring. I personally know of people who had lightning enter their house through the coaxial cable lead-in from a grounded tower/antenna. In such a system the two-position coaxial switch introduced by MFJ Enterprises would shunt the current to the rig. A grounding coaxial switch is not a substitute for disconnecting your antenna from the rig. Any time there is the slightest chance of a storm, disconnect the antenna, ground and power leads. Don't just turn the coaxial switch. Do not use a coaxial switch as a lightning arrester. This is not what they are designed for. Keep your rig disconnected from the antenna system when not using it. It is also a good idea for all of us periodically to check our antenna ground system and its connections."

In the UK, where lightning is much less frequent than in some parts of the USA, I suspect there are few of us who keep the rig disconnected when not in use, and the main requirement is to prevent static build up from discharging through the rig; for such purposes spark gaps and the old style of external knife switch is often regarded as adequate.

Lightning hazards

While static discharge is regarded as adequate for modest antenna installations, it cannot be assumed that this is sufficient in the case of major installations, particularly those with high towers in exposed locations. To judge from the illustrations in the journals and from the way in which choice 14MHz dx has become so much more difficult to work in recent years with simple antennas, there is an increasing number of installations where the antenna system is far from modest.

Come a thunderstorm and I feel decidedly less sorry that there is no really high metal tower at my QTH. This has been reinforced by dipping into a large 127-page (A4 format) book published by the European Broadcasting Union: *The protection of broadcasting installations against damage by lightning*. This stresses that protection of transmitting stations "requires a large number of precautions against the effects of direct and indirect lightning strikes and these precautions must be effectively co-ordinated. In the case of direct strikes on any part of the station, the lightning energy must be dispersed harmlessly; in the case of indirect strikes... dangerous voltage surges must be limited to tolerable levels".

Few amateur stations are really protected against strikes, but it is most advisable, particularly with solidstate equipment, to prevent the effects of indirect strikes from getting into the equipment. No system can guarantee absolute security. Lightning discharges result in thermal, electrodynamic, electrochemical and electromagnetic field effects. Massive peak currents with steep wavefronts result in potential differences of several millions of volts and very high electromagnetic field strengths. Towers need to be really effectively earthed when attempting to do more than just provide leakage paths for static build-up, static-charged rain etc. But even static build-up can damage receiver front-ends and solidstate transmitters. Even valve receivers can have their first-stage coils burnt out, and indeed this used to be a common problem with both HRO and AR88 receivers (sometimes from static, sometimes from rf induced from local transmitters at the same site).

The EBU book describes the very formidable requirements for earthing high towers and the associated problem of providing protection against corrosion arising from metals in direct contact with damp or acidic soil; in effect, galvanic cells are formed, resulting in parasitic currents that hasten corrosion. It suggests that this constitutes a serious factor that significantly reduces the long-term effectiveness of earth-electrodes. For direct burial in soil, a solid conductor is less subject to corrosion and more resistant to mechanical stress than a stranded conductor of similar gauge.

Because of the electro-chemical characteristics of different metals, earth-electrodes of copper or steel with copper sheathing should not be bonded to earth-electrodes of more electro-negative materials such as galvanized steel or to other buried steel objects such as pipe work and tanks: see Table 1.

Table 1. Electro-chemical characteristics of metals used for buried electrodes

Metal	Electrode	Potential (V) relative to a saturated copper/copper-sulphate electrode	
		Minimum	Maximum
Copper	Embedded in Soil	0	-0.1
Steel	Concrete*	-0.1	-0.3
Lead	Soil	-0.4	-0.5
Steel	Soil	-0.5	-0.7
Zinc	Soil	-0.9	-1.1

*For example, foundation reinforcement bars
(Source: *The protection of broadcasting installations against damage by lightning*)

Earth conductivity of some rocky hill sites can be very low, and techniques of "earthing improvement" have been developed. The EBU book points out: "The resistance of a mountain cannot be modified by technical means; it is determined by the natural properties of the substratum and by the weather. Corrosion and bedding resistance, on the contrary, can be reduced by appropriate measures, termed *earthing improvement*, such as increasing the soil conductivity by injecting highly-conducting solutions and thereby reducing the contact and bedding resistance. Formerly, use was made of saline solutions, although they were very conducive to corrosion. More recently, lygroscopic emulsions have been developed for this purpose. In order to facilitate the penetration of the emulsion into the rock, blasting is sometimes necessary. In the case of high-altitude transmitting stations, where rock of very high resistivity is often

found, earthing improvement is in most cases essential. By emulsion injection, lower earthing resistances are obtained, independent of fluctuations in the air temperature and humidity, even where the soil conductivity is exceptionally low. In very acidic soil, the application of this method will, moreover, provide adequate corrosion protection.

"Care must also be taken that the earth-electrodes are buried below the frost line. The freezing of the soil considerably increases its resistivity; an earthing installation for a power-supply system can have an entirely satisfactory propagation resistance during the warm season, but an unacceptably high one during the winter. For lightning protection earthing systems this is, however, not so important, because the lightning current is impulsive, and in icy ground the surge impedance of an earth-electrode is less than its propagation resistance."

I am not suggesting that amateurs on hill-top sites should start blasting operations or emulsion injection, but the fact remains that if amateurs insist on setting up installations akin to local broadcasting installations, they should be aware of the lengths to which the professionals go to earth their towers. There is also the point that for monopole verticals, where the earth is part of the antenna system, good earthing (or earth radials) is essential to reduce rf power losses.

An isokeraunic contour chart of the world in the EBU book gives the average number of "thunderstorm days" per annum in the various regions. This shows that the Shetland and Orkney Islands have only 1 to 5 such days; Scotland, Ireland and the north of England between 5 and 10. This compares to between 40 to 60 in parts of the mid-west of the USA, up to 100 in the Australian outback, and over 140 thunderstorm-days in some tropical countries. The variation is thus very large, but even in the Shetlands, if you believe in Murphy's Law, there is just a faint possibility that your impressively high tower may be struck when the rare thunderstorm occurs!

In *QST* (August 1986), Dennis Bodson, W4PWF, begins a series of articles on "Electromagnetic pulses and the radio amateur" condensed from an official National Communications Report. This covers the extremely difficult problem of protecting radio installations from the effects of electromagnetic pulses produced by deliberately or accidentally exploding nuclear devices at high altitudes—a possibility that would seem to have been increased by the work on sdi ("star wars").

NEMP has an even steeper wavefront than lightning, and the survival of all forms of telecommunications equipment, computers etc would be in jeopardy. While nemp protection measures would also serve to provide lightning protection, I cannot help feeling that in a small country like the UK, survival of our gear in a nuclear war or after a nuclear accident is likely to be the least of our worries! For those who think otherwise, a useful start would be to switch back to valves rather than solidstate equipment, but there is little chance of that advice being taken.

The valve that changed everything

Dean Manley, KH6B (*77* February 1986), in initiating "Project 6L6" reminded us that 1986 is the 50th anniversary of the introduction of the 6L6 beam tetrode by RCA Radiotron. I added that this soon led to the 807 top-cap version for rf as well as af applications and the loss of later single and double rf beam tetrodes.

Bill Orr, W6SA1 (*Ham Radio*, August 1986, pp43-5), follows up this theme by recalling in detail the evolution of "the tube that changed everything". In doing this he brings to light the reasons why the pre-war 807 was usually a stable valve *without* neutralization. Later this was seldom the case.

It was in 1935 that General Electric (US) developed the idea of "metal"

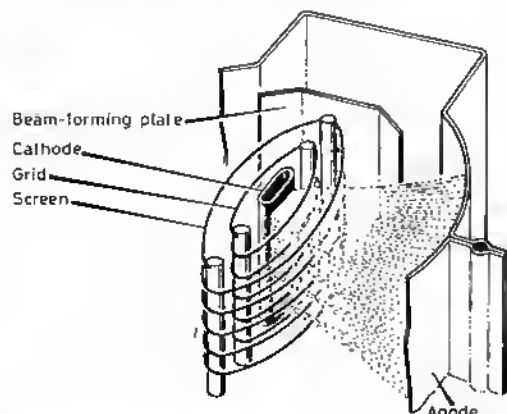


Fig 7. Electrode structure of beam tetrode with aligned grid and screen electrodes and beam-confining plates connected to the cathode

receiving valves that needed no external screening and granted RCA a manufacturing licence. A team under Otto Schade was already developing a new valve technique that they believed would overcome the relatively poor performance of power valves in terms of low-gain and low-efficiency when used for other than small-signal applications. The electrode structure comprised a tetrode valve using aligned grid and screen electrodes and beam-confining plates connected to the cathode, Fig 7.

The aligned grids and the beam-confining plates had much the same effect as a pentode's suppressor grid in removing the awkward "kink" in the characteristics of the screen-grid tetrode. The kink is caused by the fact that when an electron travelling at considerable velocity strikes the anode, the force of the impact dislodges other electrons into the inter-electrode space and will be attracted to a positively-charged screen electrode during those periods when the anode voltage swings below the screen voltage. This causes a reverse current known as secondary emission to flow between anode and screen. This can be largely overcome by the use of a suppressor grid (pentode) or by the insertion of beam-forming plates whereby electrons emitted by the cathode are directed to those parts of the anode which are at a critical distance from the other electrodes.

So was born the metal 6L6 with its possibility of producing up to about 35W rf (more if unduly punished) as a crystal oscillator. A pair of 6L6s could equally well provide some 25W of audio power with just 400V ht.

The metal valve was rather costly to manufacture, and late in 1936 came the alternative glass 6L6G providing, as has been noted in *77*, improved rf performance. At the same time the electrodes of the 6L6G were slightly rearranged and a top-cap anode connection added to form the 807 (6.3V heater) and 1625 (12.6V heater). These early 807s had additional internal insulation to give a maximum voltage rating of 600V, and small shields were added around the base of the stem to reduce internal feedback paths. Amateurs adopted the 6L6 and 807 valves as suitable for power amplification *without* neutralization. A 6L6G—807pa transmitter was described in a number of handbooks in this form. The idea was also adopted for the SCU "Mark 3" transmitter (6V6 co—807 pa) used for many years from about 1938 onwards. The 6V6 was a low-power 6L6.

But after about 1941, when the USA entered the second world war, production of the 807 had to be increased dramatically. As a result the special insulators and internal base stem shields were eliminated to reduce costs and facilitate production. The 807 thus became virtually a "topcap" 6L6G. When amateur activity re-started in 1946, many 807 rf power amplifiers were built to the pre-war designs, intended for the pre-war 807. As a result the 807 was soon found to be unstable above about 10MHz (sometimes with poor layout at much lower frequencies).

I recall an article "Beam tetrodes used as rf amplifiers" by Charles Bryant, G3SB (*RSGB Bulletin*, October 1950, pp135-6) which began:

"When the beam tetrode was introduced some years before the war, it was thought that at last an amplifier was available which did not require to be neutralized. Most amateurs who employed these valves in their transmitters soon found this was not so."

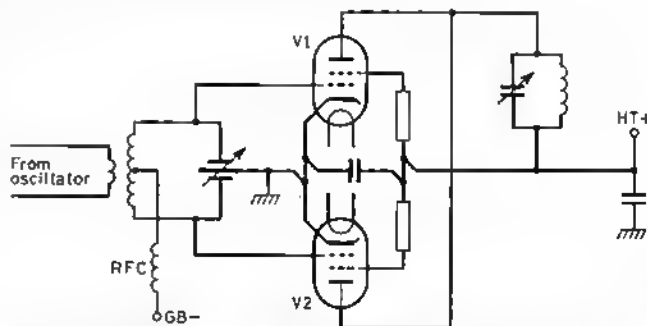


Fig 8. Neutralized beam-tetrode amplifier arrangement occasionally used in the late 'forties and early 'fifties to overcome the unexpected stability problems brought about to some extent by the cost-cutting design of 807s for wartime mass production. When V2's heater is unpowered, the valve acts as a neutralizing capacitor. When powered, the stage becomes a push-push doubler

The anode-to-grid capacitance of the 807 was given as 0.2pF and the 6L6 as 0.7pF. G3SB showed a technique culled from *QST* whereby a second 807 (unpowered) formed a neutralizing capacitance: Fig 8. With the heater of V2 powered, the stage converts into an efficient push-push frequency doubler. However, as he pointed out, although 807s were then plentiful and cheap, this arrangement took up quite a bit of space without providing any more rf output in the amplifier mode. Neutralizing an 0.2pF capacitance is not easy. G3SB suggested, as an alternative, the use of a cathode-follower driver, at least for low-power transmitters.

In the USA and later in Europe the 807 began to fade out and was replaced by the 6L46 and the use of capacitance divider neutralization. However, the 6L6G was adapted as a sweep-tube in many early American tv sets with later versions 6LQ6 and 6MJ6 (both of which found considerable use in hf linear amplifiers) and for hi-fi audio amplifiers as the 6L6GC/6L6GB.

Despite the gradual swing to solidstate rf power amplifiers, the majority of hf transmitters in use today continue to use beam tetrodes either in transceivers or in external linear amplifiers or both. An understanding of the ills of valve rf amplifiers remains essential for most radio amateurs—though you would not think so from the RAE syllabus!

Neutralization of rf amplifiers

The notes on parasitic and tptg oscillation and other ills that valve and solidstate rf amplifiers often suffer (*TT*, August, pp570-2) have prompted "Jakey" Gould, G3JKY, to add some further useful advice on neutralization and grounded-grid amplifiers. He writes:

"First of all, I feel Fig 3 of the August *TT* could be a bit misleading. For the makeshift 'capacitor' shown in (b) to work, the grid circuit would have to be balanced, not the anode as shown in (a). (Agreed, I should have made it clear that these two diagrams were not linked in P R Keller's book—G3VA.)

"One of the nastiest problems with neutralization of tetrode and pentode valves is how to adjust the capacitor without either: (a) finding the presence of the trimming tool affects the neutralization; or (b) drawing sparks off the capacitor due to its being connected to dc. For instance, the neutralization capacitor in the FT100 transceiver has one end at 600V and the other at 300V. Shorting the latter to chassis burns out the driver rf choke quite rapidly.

"A better scheme involves a fixed 'feedback' capacitor and variable capacitance to earth, forming a capacitive potential divider as in Fig 9(a)." (I have added as Fig 9(b) a basically similar form of capacitive potential divider for unbalanced circuits that has been widely used at hf—G3VA.)

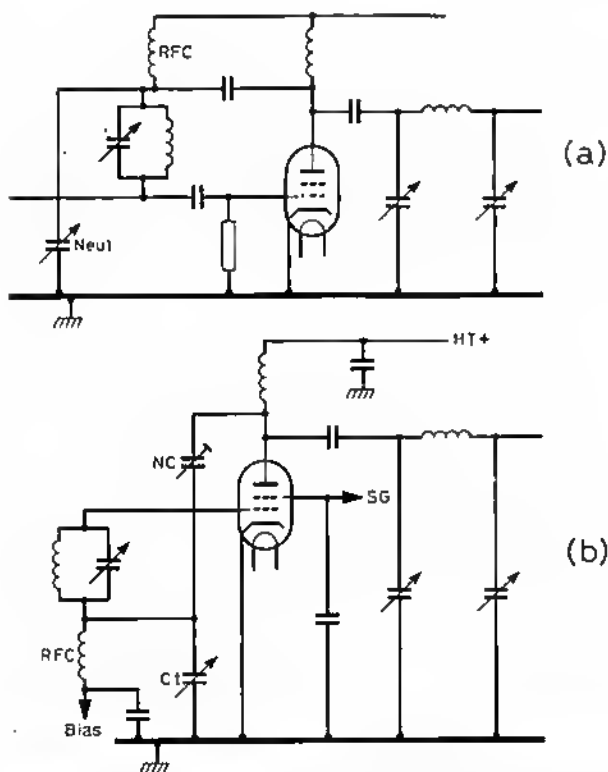


Fig 9(a). Use of a capacitive potential divider to facilitate neutralization of beam tetrodes. (b) Popular form of bridge neutralizing circuit when there is no balanced input or output tuned circuit. In practice NC is often fixed and C1 made variable to about 500pF (this is a safer arrangement as it removes ht from the adjustable capacitor)

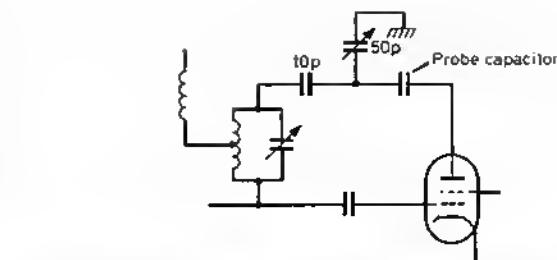


Fig 10. G3JKY points out that adding a third capacitor can provide a convenient form of neutralization up to about 200MHz with such valves as the 4CX250B. The small-value 'probe capacitor' can be similar to that shown in Fig 3(b) of the August *TT*, cut or bent to bring neutralization within the range of the 50pF trimmer

"For the least inter-action between tuning and neutralization a third capacitor can be added as in Fig 10. I have used this arrangement up to 200MHz with 4CX250B valves with fairly conventional tuning capacitors and coils. It still worked at 300MHz when using coaxial grid and anode lines, the grid-line 'probe' capacitor being between the end of the half-wave line remote from the valve and the voltage minimum point near the valve to obtain anti-phase feedback as in Fig 11.

"Above about 350MHz this seemed even easier mechanically, as the grid probe could be right at the grid terminal. This is because at higher frequencies the voltage minimum point on the line disappears 'inside'. This can be shown by clamping the valve in its holder to a sheet of metal, and attaching various lengths of rod or tube to the grid to form an open line as in Fig 12. A gdo may then be used to find the lengths of line corresponding to various frequencies.

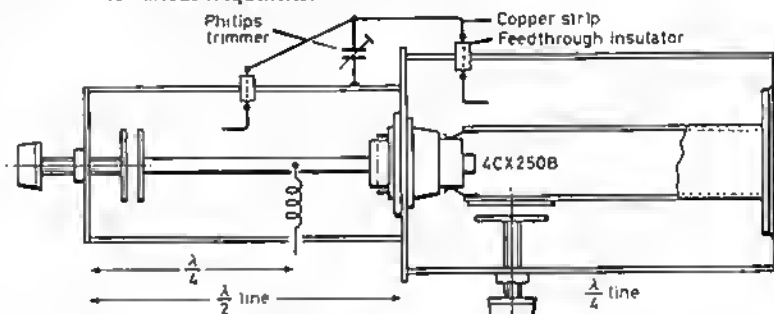


Fig 11. The arrangement of Fig 5 adapted for use with coaxial grid and anode lines. G3JKY believes that side discs as shown in the anode line are preferable to end-disc capacitors. With this (and many other neutralizing arrangements) beware of high rf voltages (and often high dc voltages) on the neutralizing capacitor. He also warns that typical fans running at 1,400-1,500rpm do not build up enough pressure to cool a 4CX250B in a coaxial line amplifier

"On vhf, I am not sure that the so-called 'series-resonant' screen neutralization is (or was) just that. I suspect that the capacitances between anode and screen and screen and grid, together with the inductance between screen and ground, combine to form a 'notch filter' between anode and grid. Transforming the 'star' into a 'delta' would effectively put an inductance across the anode-grid capacitance—unless you know better. This would make the arrangement somewhat frequency sensitive. I recall some published circuits actually added an inductor in the screen lead.

"Finally, on the question of grounded-grid amplifiers as raised by Richard Measures, AG6K, in *Ham Radio*. I can certainly confirm the need for effective grid bypass capacitors. Depending on the ratio between the anode tuning capacitor and the anode to grid capacitance of the valve, a

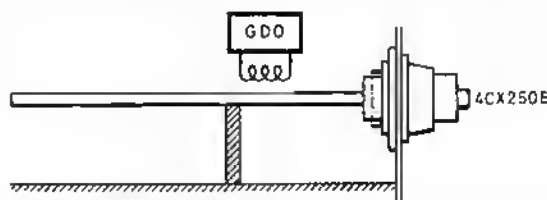


Fig 12. Use of a gdo to find line lengths for various frequencies. G3JKY believes that a telescopic rod antenna would simplify this operation, although he has not used one himself. He notes that between about 300 and 350MHz resonance usually occurs with the line a physical quarter-wave, indicating that the valve appears as a series-resonant circuit

proportion of the anode tank circuit current flows through the grid bypass capacitors! At some frequency this seems almost certain to cause the amplifier to go (to quote the immortal words of the late John Campbell, W2ZGU) 'whee-whoo, but good!'

"After much fun-and-games with a pair of 830s, which have a hefty anode-grid capacitance, I am resigned to either earthing the grid directly and providing a floating negative line, or returning to the push-pull neutralized arrangement I had before I became greedy and wanted to work more than one band!

"Another curious phenomenon with a g-g amplifier was with a TY-125 on 144MHz. With this circuit, all the anode tank current went through the grid capacitors. Tuning the anode circuit produced a very encouraging dip in anode current. The snag was that the amplifier showed no inclination to 'draw' and gave very little output. The explanation seems to be that the current in the bypass capacitors produced negative feedback (for a change) and effectively reduced the drive. Presumably, the valve did not have enough gain to go unstable at higher frequencies where the feedback became positive. Again, shorting the grid to chassis and floating the filament at bias voltage solved the problem."

The *Hann Radio* article by AG6K has also provoked supportive correspondence in that journal from NJ0G and W2YW. W2YW relates a horrific story of how he has had *three dozen* 572 valves fail in the manner described even though the amplifier was grid-driven, neutralized and had parasitic suppressors in both anode and filament leads. The big bangs that accompanied each incident were of sufficient current to blow 30A fuses in the 234V line feeding the power supply. He believes the trouble dates from around 1981 when the manufacturer changed the amplification factor of the 572 from 160 to 200.

NJ0G, on the other hand, mentions production experience with several hundred hf linear amplifiers using Eimac 8874 and 8877 valves without seeing a single case of parasitic oscillation or instability of any kind. He believes the key factor is the use of Eimac's recommended valve sockets (8874 EF Jolinson socket as specified; for 8877 the Eimac SK-2210 socket). The need to use the correct sockets for the 4CX250-series of valves has been emphasised many times in the past by G4FRX. Incidentally, a major problem these days with valve equipment is finding good sockets for the various bases (there can also be a problem with some rarer types of finding the pin connections even if you have kept your valve data books).

Open-wire feeder spacers

I thought that 77 had about exhausted the topic of feeder spacers over the past year or so. Certainly, there is a deservedly increasing popularity of multiband centre-fed dipoles or doublet antennas, call them what you will. With a suitable attenuator providing balanced output over a range of impedances, such antennas can be made to work well on any hf band regardless of the precise dimensions of the 'top' unless this is absurdly short in terms of wavelength.

A long letter from A R Johnston, G4OGP, who designed and now markets the SPC300 etc series of antennas, draws attention to his spacers (2' 5in, 64mm spacing) designed to be attached very easily to any wire up to 1.5mm diameter (preferably multistrand pvc-covered wire). With 1.4mm multistrand this has a 580Ω impedance, making it suitable for either 600Ω non-resonant or resonant lines. The basic material is ultra-violet stabilized dark (black) polypropylene to a design he patented about 1981. He recommends spreaders spaced at about 4ft intervals with two thin nylon cords or fishing line around the ends of the last downward-running spacer to keep the line taut.

His own 130ft line to a 580ft doublet (there must be more room up in Lancashire than in south London!) has been up for over four years without problems, despite wind gusts exceeding 90mph. He suggests such feeders can be used from 1 to 150MHz, though I am not sure that his very simple way of fixing wires to spreaders by half looping the wire round notches might not prove rather inductive at 150MHz (thinking of the way telephone lines are inductively loaded, perhaps this would be no bad thing). His address is 63 Hallcroft, Birch Green, Skelmersdale, Lancs WN8 6QB.

In *QST* (August 1986, p38) two further suggestions appear. WA8MLV uses '120'-size plastic film spools. W0TOY claims that up to 15 2in spacers can be cut from coat hangers made of 3/4in diameter plastic. But don't bank on these materials being ultra-violet stabilized!

Tips and topics

The American semiconductor firm Signetics is, like Mullard Ltd in the UK, part of the large Philips group of companies. One result of this is that Mullard have recently published a series of product specifications and application notes on two extremely interesting ic devices originally developed by Signetics but now being marketed in the UK by Mullard. These are the NE602 mixer/oscillator and the SA/NE604 low power fm i.f.

system. Both devices seem well suited to amateur radio applications, and the notes include work by Bob Zavel, W7SX.

For example, the Mullard AN1981 publication *New low power single sideband circuits* (8pp) lets W7SX take a new look at Weaver 'third method' ssb generators and ssb detectors, including the use of two NE602 mixers in a phasing-type direct-conversion receiver which gets rid of the 'audio-image' problem; W7SX also shows how crystal filter methods are inherently more expensive and tend to restrict the use of ssb in some applications. Other publications (available from Technical Publications Dept, Mullard Ltd, New Road, Mitcham, Surrey CR4 4XY) include: AN1982 *Applying the oscillator of the NE602 in low power mixer applications*; AN1991 *Audio decibel level detector with meter driver* (by W7SX); AN199 *Designing with the SA/NE604*; SA/NE604 *Low power fm i.f. system* (product specification); AN198 *Designing with the SA/NE602*; SA/NE602 *Double-balanced mixer and oscillator* (product specification).

Attention is also drawn to two recent papers by Peter Chadwick, G3RZP, of Plessey Semiconductors: *Advances in single chip frequency synthesizers* and *Phase noise, intermodulation and dynamic range*.

Although the proposal of using a musical 'reed' as the diaphragm of an earphone to provide a fixed-tuned filter for cw reception (77 January 1986, p39) was published first in *QST* as an 'April fool' joke, I continue to receive reports that not only can the system be made to work, but work well. Bill Craig, G6JJ, comments: 'The late Bill Bailey, G2QB, demonstrated his 'phones modified in this way with mouth-organ reeds and they worked very well, though unsuitable for high-speed Morse because, as in any other narrowband system, speed is limited. I think the difference was that the Australian device used aluminium or other non-magnetic material for the main part of the diaphragm, whereas G2QB used normal magnetic diaphragms and had a residual effect from them, although the main audio note was generated by the mouth-organ reed mounted in the slot in the centre. He was a superb model engineer, and I believe he used 12BA screws for mounting the reeds.'

G6JJ believes that details were published, but has failed to trace where. He did, however, come across G2QB's description in *QST*'s 'Hints & Kinks' (November 1962) of a 'finger key' based on two straight keys mounted at a slight angle to one another and provided with extensions. One key is connected to the electronic keyer dot contact and the other hand key to the dash contact. Keying is then with two fingers in similar fashion to piano playing. After a little practice the mental and muscular reactions quickly drop into place. The actuator and keyer were built in a single box, making the whole unit self-contained. □

BOOK REVIEW

GCHQ—The Secret Wireless War 1900-86, Nigel West, Weidenfeld & Nicolson, 1986. 294 + xviii pages. Hard covers £12.95.

Ever since Paul Wright, G3SEM, researched and helped produce the BBC television programme 'The Secret Listeners' (VHS copy available to clubs from the RSGB Tape Library) and his subsequent *Radio Communication* article (December 1980, pp1299-1301) there has been an increasing interest, even among those born long after the second world war ended, in the secret role of the 1,500 or so pre-war British radio amateurs who were enlisted by Lord Sandhuist as Voluntary Interceptors in the Radio Security Service (initially part of MI5, later MI8c) or the many who served in the Special Communication Units, the Special Wireless Groups or in the main Inter-Service interception organization (Y-Service). It was not until the 'seventies that it became possible to reveal the extent to which high-grade enemy ciphers, including the Enigma machine cipher, were consistently 'read' for many of the war years at Bletchley Park (known as 'BP' or Station X) and the contents largely distributed over a special SLU/SCU hf radio network as 'Ultra' or 'Pearl' information.

The Vts and SCU3 were concerned primarily with monitoring the extensive radio networks of the Abwehr (German Military Intelligence) and the RSHA (German security police), whereas the Y-Service concentrated on the mass of transmissions of the German army, navy and air force. British signals intelligence had first got under way as part of Naval Intelligence in the first world war with code breaking done at 'Room 40'. Bletchley Park entered the second world war as the innocuously-named Government Code & Cipher School (GC&CS) answering to 'C', head of MI6 (SIS). It emerged under Foreign Office control as GCHQ, subsequently moving first to Eastcote and then to Cheltenham.

In this new book, Nigel West brings together a mass of detail relating to British signals intelligence, and gives much credit to the work of radio amateurs (perhaps too little to the Y-Service on which BP depended for most of its intercepts, or the 'traffic analysis' work carried out at Barmley). It is also not surprising that a significant number of minor, but decidedly off-putting, errors have crept into the book. These are unlikely to be spotted by those who were not directly involved and will not reduce the interest of such readers. But as far as the *WISCU* story is concerned, a much shorter but more reliable account remains the December 1980 *Radio Communication* article.

G3VA

Members' Mailbag

THE EDITOR,
RADIO COMMUNICATION,
LAMBDA HOUSE,
CRANBORNE ROAD,
POTTERS BAR, ENG 3JE

The views expressed in published correspondence are not necessarily those of the RSGB, and readers are urged to verify independently any factual statements on which they may wish to rely as it cannot be guaranteed that such statements are correct.

BEST SERVED BY TOLERANCE

Sir—Like G3CMM (June "Members Mailbag") I am unable to send Cyrillic cw. Neither do I know how to home-brew a transmitter with very limited resources and materials.

One thing I do know is that amateur radio is best served by tolerance and understanding. I suggest that instead of making snide comments he invests in a decent filter for his receiver.

Tom Morris, G4XTM

FREQUENCY MODULATION

Sir—I much enjoy reading the various contributions to "Members Mailbag" and those from Pat Hawker—in *Radio Communication* and elsewhere—on the above subject.

May I make a plea for modulation index to be expressed as radians and not tell as a number? Because the units cancel out, the definition of angle has no dimensions. The useful fact that modulation index is simply the maximum phase shift of the carrier (relative to an imaginary "reference" carrier) is rarely expressed.

T J Wynn, RS43579

THE 10MHz BAND

Sir—As a regular user of all three WARC bands I feel that I am well qualified to comment on the proposal by the sideband lobby to permit the use of ssb in the 10MHz band.

Firstly, I do not agree that the level of activity is lamentably low, having regard to the limited number of clear frequencies between the commercial and other stations with whom we share the band. It is often quite difficult, particularly in the evenings, to find half a dozen clear frequencies in the entire band. This is probably the reason why so many stations crowd in the first 3 or 4kHz at the lower frequency end of the band.

To let loose thousands of sidebanders, some with their speech processors and linear amplifiers, over such a limited number of clear frequencies would result in absolute chaos in the part of the band allocated to them. This would certainly cause serious interference to the primary users of the band and would, I feel, result in many countries voting against future amateur use of the band at the next WARC conference considering this matter.

It is not worth the risk involved and the proposal should be strongly resisted by the RSGB at the appropriate WARC conference.

If the sidebanders want to investigate long-path chordal-hop propagation then I suggest that they spend a few weeks brushing up their Morse code and then join the cw users of the band.

There is plenty of dx activity on the 10MHz band and I have worked 49 countries so far.

F H Waits, G5BM

Headquarters staff living in London and the southeast occasionally find that there are no clear frequencies in the 10MHz band after about 1800; those which are clear are usually at the lower frequency end. Any comments from other 10MHz users?

CODE AND PRACTICE

Sir—After four attempts I have finally achieved what was beginning to seem unattainable—I have passed the Morse test. It was a hard struggle, requiring a greater effort sustained for longer than anything I have ever previously attempted. But now that I have passed, the pleasure and sense of achievement at having slayed the course is hard to describe.

However, I haven't done it alone, so I would like to use a few lines to say a sincere "thank you" to all those amateurs who got me through. For many months past, a loyal band of enthusiasts have given hundreds of hours practising slow morse with me over the air. It was their encouragement and dedication that did it. It seemed that the task for them was as personal as it was for me. Thanks friends—I hope you now feel some of the pleasure in my success that I feel. Although hard work, it's been great fun, and I hope we'll all carry on now spreading my new expertise on the hf bands.

The Class B variation has been very valuable to me. I live in the country, where radio amateurs and particularly cw students are a bit thin on the ground. Meeting regularly for practice at home is rather difficult. While the RSGB slow morse sessions are very good and extremely welcome, for me it was the variation that made it all possible.

For the benefit of other Class B licensees who are still slaving over a hot key in pursuit of the "A" licence, I offer the advice given repeatedly to me in the early stages. "The only people who don't pass are those who give up." Whoever originated that gem knew a thing or two.

With grateful thanks to all my helpers.

Philip Jacob, G6VFG

We have received several letters in the same vein, and the Class B variation seems to be working well. See the June and July 1986 RSGB News Bulletins for guidelines on how to get the best out of this facility and the answers to some basic questions about it.

AND MORE "THANK YOUS"

Sir—I wish to express my sincere thanks to Norman O'Brien, G3LP; Andrew Cater, G0EVX; George Dobbs, G3RJV; and the many other amateurs, especially the Cheltenham Amateur Radio Association, for their efforts to help me with shortwave listening, part of the Duke of Edinburgh Award Scheme.

For the past few months, they have introduced me to a fascinating hobby and shown me the true helpful nature of the amateur fraternity.

Phillip Le-Brun, BR87677

Sir—I recently put an advert in "Members Ads" and I would like to thank the many (about 25) people who called/wrote to me with valves/manuals/stories and advice. Many of these would not take any money, even for postage. I feel this kind of amateur friendship all too often goes unnoticed, but definitely proves that not all amateurs are "get-off-my-frequency" types.

I never expected the amount of interest I stirred up from people who used to use this type of receiver.

Dave Reid, GMOBZF

... ONLY A HOBBY

Sir—What a pleasant feeling and relief it is to open *Radio Communication* at "Members Mailbag" and find that out there in this big wide world is someone who really cares about what the hobby is all about.

The letter from D A Guest, G4RSR, must be hailed as letter of the year. Reading between the lines, G4RSR must have sat back for some considerable time listening on the air and reading in the popular amateur radio press about those members—extremists he calls them—venting their feelings to the detriment of the hobby in general.

I agree wholeheartedly that these pages are becoming an airing ground for some members of the hobby, which, in reality does nothing for the image of amateur radio. The most important sentence of the G4RSR letter, and I quote, "is it not time for amateurs to put their hobby into perspective because after all it is only a hobby". How many people after reading that sentence or, for that matter, have bothered to read G4RSR's letter in your July issue, can put hand on heart and state that they were brought up the hard way, sat the real exam, and put so

many bits and pieces of gadgetry together, that they are, in fact, "above all others".

Should we not, as members of a great world wide institution, move forward in unison to the benefit of both old and new before it is too late to do anything about the rot. Oh yes, there will be disagreements along the way; however, at the end of the day we should all be pulling as much as possible in the same direction, with one goal in mind, improving the image of amateur radio.

I am not a young or new hot-headed upstart, my feelings are those of concern for the future; however, you can be assured you have another person who has this great and wonderful hobby at heart. How many others, with this journal in their hands, reading this letter, can honestly say the same? An interesting question.

Ian S Martin, GM1ARG

Is it "... only a hobby" or is there more to it than that? If it is, it's certainly a very special one—let's have your comments.

BIRD TROUBLE—FEATHERED VARIETY

Sir—Since I became licensed, my wife and children have become accustomed to living with a radio amateur in the family. However, there is one sore, or rather sticky, problem I have causing family inconvenience, namely bird droppings.

Living in a house with the garden at the back I had to mount my antenna mast on the rear wall of the house in order to achieve maximum height over the apex. Unfortunately the back door and patio are situated underneath the antennas (h, beam and inverted-V dipole) so you can appreciate the bird-dropping problem when the children are playing there. Because of visual and height problems I cannot move the mast to another position without substantially degrading antenna performance.

I appreciate that my problem might sound a little strange, but I am certain that there must be many more radio amateur families who encounter the same problem. I would therefore appreciate it if you could help me in any way with the solution of my "messy" problem. So far I've tried birdnetting and greasing the antenna without any long-term success.

Looking forward to a possible solution with thanks.

E Meekers, G4SNR

Well, we thought we'd come across every conceivable amateur radio-related problem in our time but this is a sticky one (groan). Apart from keeping a couple of cats as a deterrent or coating the antennas with some form of Teflon-based substance, we can't think of a quick answer—any ornithologists out there with the solution?

WITHHOLDING PARTICULARS

Sir—The "particulars withheld" letter from G3MWV in your September issue prompts me to ask what possessed him to join the amateur radio fraternity, many of whom believe that humanity, community and, above all, friendship are the stuff of life.

His attitude is a negation of those principles, and I for one would like to say to anyone and everyone: "Please come to visit anytime you like, WELCOME is permanently on the mat."

E W Green, GOATS

Sir—As a listener over the frequencies for some years, my interest is derived from logging geographical positions of the call signs heard during the course of each session. If your call sign book were to have no entries, there would be little reason for monitoring the wavelengths.

However, I tend to agree with opinion that full addresses are unnecessary, especially if you own expensive equipment. I can see no real reason for exact street locations since any sufferers of interference should really direct their complaints to the authorities and eager contacts should perhaps establish written communication via the QSL Bureau first before

calling in person. But we should insist on some form of location being given with the call sign, as one has no reason without the other.

Why don't we use the town plus the locator? It does seem the logical reference to give with the call sign and name, and fulfills all the requirements for verifying transmission origins and distance (the town because it provides a very quick reference for those of us that still have difficulty with locators). However, I do think the RSGB should also have a full database whereby bona fide members can write in to obtain the address for specific enquiries etc.

To withhold all details of the location from the call sign reference reminds me of the anonymous nature of CB "handles" originating from their illegal a.m. days and fear of detection?

Greville Begg RS51881

Sir—Regarding complaints about amateurs "withholding particulars"; I am one of those amateurs and I intend to stay one, I like my privacy.

J W Dainton, G4PDN, suggests refusing to publish the call signs. Please do so, that is the reason for withholding particulars. I shall also thank the RSGB on the day this is done.

I never wanted my call sign published in the first place; if anyone wants to QSL then do so via the bureau like thousands do.

D S Hughes, (call sign withheld)

Sir—I understand that the Society would like the views of "particulars withheld" members. I

am one such, but for two years I managed to persuade the powers that be to print only my PO box details. They resisted this, but eventually agreed, as several other amateurs have details other than home address in the Call Book.

I am perfectly willing to have my town mentioned in the Call Book, although for professional reasons I would not let my home address be known. I wish they would let me put my PO box in again.

Incidentally, for the benefit of the G3 who does not send QSL cards, I understand that the largest private club in the continent has the motto: "The final courtesy of QSO is a QSL card". I stress courtesy.

Paul Thompson, G6MEN

Sir—Faced with the stark choice—"Particulars withheld..." or having my full address inserted, I reluctantly opted to be "Particulars withheld"; but I would much prefer to see name, town or village, plus county, as this would greatly enhance the usefulness of the Call Book—as I have already discovered in the few months I have held a licence. This procedure, if adopted, would give all the detail other amateurs need to have without pinpointing the exact address.

I would be delighted to appear in the book as: E A Wood, G1TPT, Newhaven, E Sussex

These letters are a cross-section of many received on this topic, and there does not appear to be a common factor in what individual amateurs require. Within reason the

Society will publish whatever people want and provided they have given express permission, hence both G6MEN and G1TPT's requirements can easily be met. However, one consequence of the Data Protection Act is that both the Society and the DTI are prohibited from publishing information unless individual amateurs indicate positively that information may be published. There is an inordinately large number of "particulars withheld".

MORSE PRACTICE SPEEDS

Sir—Almost any evening in a search over the 144MHz band one hears: "This is station G... sending slow morse on behalf of the RSGB". The majority of stations send good morse and I am sure it is appreciated by those endeavouring to obtain the necessary speed for the morse test. However, I would like to make an appeal to these stations to be very careful about announcing the speeds at which text or figures will be or has been sent.

In a random check of three stations, speeds were always under-estimated, the 12wpm being checked as 11, 11 and 10.5. To these stations I would say: "Try out your text before you go on the air, it is better to send slightly faster than your announced speed". Remember, when you say: "That was 12 words per minute" when in fact it is only 10 or 11, raises false hopes for the learners.

Since transmissions are invariably "on behalf of the RSGB" surely something can be issued as a guide for stations sending slow morse.

T L Stokes, G3JTS

OBITUARIES

The Society records with regret the deaths of the following radio amateurs:

Mr C C Algar, G6AU

Mike Algar died on 11 September aged 73. He was first licensed in 1933 as 2BVH, then in 1934 as G6AU. He was well regarded in the Lancashire area, and was a familiar voice on 144 and 432MHz. In recent years, rily and atv were his major interests.

Mr R Chilcott, G8PGV

Roger Chilcott died on 1 July aged 40. He was an active member of the Hereford club, and of Raynet in South Warwickshire up to 1981.

Mr D J Cooke, G6WHM

Dudley James Cooke died on 13 June aged 69. Although only recently licensed he was keenly interested in radio all his life. He was a founder member of the Huntingdon RS, and active on 144MHz.

Mr R J Copeland, G13NZZ

Robin Copeland died on 3 September aged 55. He was well known on hi, QRP cw mainly on 1.8 and 3.5MHz, and on 144MHz. He will be remembered for the quiz evenings he organized at the Belfast RSGB Group.

Mr B Croker, G3ULF

Brian Croker died on 31 July aged 62. He was active on all bands 1.8 to 432MHz and made his last transmission from his hospital bed on 26 July. He was a former secretary of the Bristol RSGBG and an organizer of the Longleat Rally.

Mr I Cutler, G8TYL

Ian Cutler died on 25 April aged 61. He will be remembered for his anecdotes while running the Arborfield club net.

Mr E E Davies, G2LG

Emrys Davies died on 21 September aged 81. He was licensed from 1937 and, although blind since his early twenties, he constructed most of his equipment and was active on all hf bands and 144MHz. He was president of the Rothesay RSGBG and an active participant in many RSGB events.

Mr G Day, G4FQB

George Day died on 3 July aged 74. Despite being totally blind since 1966 he used some of the latest radio and computer equipment. His first love was cw, and he will be remembered for the many students he tutored to pass the morse test. He was a member of the Bournemouth RS and an honorary member of the Poole ARS.

Mr J Eccleston, G6GEQ

Jim Eccleston died on 1 August. He was a member of the RSGB and RAIBC, and well known in the Wigan area and on 144MHz.

Mr R W Garner, G4YHU

Roy Garner died on 20 June aged 46. He was a keen QRP cw operator and built his own equipment, and a member of the Hinkley AR & ES.

Mr C G Hobbs, G4PNS

Cyril Hobbs died on 13 June, while on holiday in Yugoslavia, at the age of 62. He was an active amateur and keen dx operator, and Treasurer of the Oxford & DARS.

Mr A E K Kenmure, G13OS

Alf Kenmure died at the age of 81 in July. He was first licensed in 1950 and operated mainly on 1.8 and 3.5MHz. A grand old man of amateur radio, his wit, humour and stories will be missed on the bands.

Mr R Kenny, VE3EWY (ex G3AAU)

Bob Kenny died on 9 September aged 66. He joined the Civilian Wireless Reserve in 1938, and during the war served in the aircraft section of filling parties based at West Drayton, and on radar countermeasures in Bomber Command. Soon after being licensed in 1946 he emigrated to Canada. When the VE/G path was open he was never happier than when working G stations and ex-CWR friends.

Mr G Partridge, G3CED/G3VFA

George Partridge died on 21 July. An ex-RN "sparks", he had built and operated radio stations for over 60 years, although he only obtained an amateur licence in 1946. He achieved some success with his principal brainchild, the "Joystick" antenna, and his exploits in trying to cover the maximum distance per watt.

Mr C R Ponting, G6ZR

Charles Ponting died on 11 August aged 74. He was a member of the RSGB and an active participant in many RSGB events.

an RSGB 50-year badge, died on 12 July. First licensed in 1927, "Poni" worked much dx with all home-brew equipment in those early days. During the war he served with the Royal Signals. In later years his activities were curtailed by health problems.

Mr J C Runge, G2RJ

John ("Bobby") (to wartime Royal Signals) died on 2 August. He commanded a successful intercept section at 8th Army HQ until just before the battle of El Alamein. On his retirement in 1980 he relieved his pre-war call and became well known for his homemade sideswiper on the RSARS cw nets.

Mr N Sheard, G2ACB

Norman Sheard died on 30 June. He had been involved in radio communications professionally since the end of the first world war, first at sea and later in the air. He had been a keen cw operator, and was active on the hf bands until shortly before his death.

Mr J H Squire, GW4OHO

John Squire died on 5 June aged 62. He was a radio enthusiast of the old school, having learned morse as a boy. During the war he served as an army radio operator with the partisans in the Balkans. He obtained an amateur licence in 1982 and was always ready to help beginners, particularly with morse lessons.

Mr G M Styles, G4IWX

Gill Styles died on 12 August aged 72. Licensed in 1974, he was a keen member of the Echford ARS until he retired to the Isle of Wight seven years ago after a life spent in the electronics industry. He will be missed particularly on the 3.5MHz "early bird" net.

Mr R C Simmonds, G2ZI

Dick Simmonds died on 21 September aged 89. He was first licensed as 5UO in 1920, and was well known in pre-broadcasting days for his record concerts on 440m on Sundays. A founder member of the Cray Valley RS, he helped many youngsters to become radio amateurs.

Also:

Mr D J A Appleby, G3IDA, in July.
Mr K R Btrkin, G8WRW, on 14 June.
Mr L T Coombes, G4DWE, on 9 August.
Mr S Crossley, RS51700, on 7 June.
Mr L. Jones, G3JTS.

The International Amateur Radio Union— Yesterday, Today, Tomorrow

Richard L. Baldwin, W1RU, president of the IARU*

WE WERE SITTING together, Steve (G2BVN) and I, in the area reserved for the IARU observers in the Geneva International Conference Centre—he in his wheel chair and I alongside him in one of the conference seats. It was the fall of 1979, at WARC-79, and we were closely following the debate taking place on the floor. The chairman of the ITU Working Group was leading the discussion of allocations in the vicinity of 10MHz. A small number of countries had, in their pre-conference position papers, proposed a new amateur band in that part of the spectrum, and the chairman was trying to lead the working group to a decision that would be acceptable to a majority of them and thus, hopefully, to the conference as a whole. A hundred kilohertz, amateur primary, was proposed and rejected. One hundred kilohertz, amateur secondary—rejected. Fifty kilohertz, amateur primary—rejected. Finally, the working group accepted, by the margin of a single vote, that the amateur service be allocated the band 10,100–10,150kHz, on a secondary basis.

Steve and I looked at each other with mixed emotions—emotions that ran from disbelief to exultation. Disbelief that we had achieved the “impossible”, that the amateur radio service was a *winner*, that we were going to have an additional amateur band. Exultation that months and years of preparation and hard work by many, many people working through IARU had finally paid off.

There were many moments of high drama during WARC-79—that moment when we had a successful conference vote for a new amateur band at 10MHz was outstanding. It was a proud moment for Roy Stevens, G2BVN, who had, literally, devoted so much of his life to the preparation for WARC-79.

How did we get there?

To answer that question we have to trace the history of IARU, and to note how it has undergone a transformation. The International Amateur Radio Union was founded in 1925, after some preliminary discussions that took place in 1924. The organizational meeting that took place in Paris in April 1925, and was attended by the representatives of some 23 countries, Hiram Percy Maxim, W1AW, was chosen international president, and Gerald Marcuse, G2NM, was elected international vice-president. As stated in 1925, the chief purpose of IARU was to co-ordinate and foster international amateur two-way communication. (As you will note from the call signs of the original president and vice-president, international QSOs were so new to the scene of amateur radio in 1925 that the country designator or prefix was still sort of an optional part of the call sign!)

So, in the early days, international communications and good fellowship were a great part of the IARU activity (and of course are still important), but with the passage of time it was gradually recognized that there were other goals that needed to be addressed. Primarily, we learned that IARU had to have as one of its major goals—perhaps its *major* goal—the representation of the amateur radio service at and between international telecommunications conferences. We learned this the hard way, particularly in the post second world war era.

There were significant ITU conferences in 1947, 1959, 1963 and 1971—significant in that each had a major impact on the amateur radio

service. There were amateur radio representatives present at every one of those conferences, sometimes being members of their country's delegation, sometimes as IARU observers, but their pre-conference preparations and their activities at the conference were not well co-ordinated. We had not yet matured in our conference preparation philosophy.

The preparation for WARC-79

Although he has never received the credit due for his contribution to our eventual success at WARC-79, the man who started the IARU down the right path was Herbert Hoover Jr, W6ZII. Hoover was the president of the IARU in 1964 (also serving as president of the ARRL) and he recognized that there was going to be another general WARC sometime in the future (in 1964 we were estimating that 1980 would be the year) and he was determined that the IARU (and the ARRL, as the headquarters society) were going to be properly prepared. He inaugurated an extensive programme of travel by IARU officers and staff to IARU societies around the world, exhorting them to establish better relations with their administrations and to vigorously establish the concept that the amateur radio service was a valuable service that deserved to be supported by each administration. He encouraged the growth of the regional IARU organizations. He set in motion a philosophy of ITU conference preparation that continued even after he left the ARRL and IARU presidencies.

By the time of the Space Conference in 1971, the IARU had learned a little, but not enough. We were slightly co-ordinated, and a bit more effective, but that wasn't sufficient and it became apparent to everyone that we had to do a better job for the next General WARC. And we did!

In 1973 in the USA a small committee (W3OKN, W4BW, N4FK, W1RU) working under the auspices of the US government, studied a good many statistics provided from the files of the IARU relating to the probable growth of the amateur radio service over the next couple of decades and the use of the spectrum by amateur radio and other services, and put together a convincing argument for a number of expanded privileges for the amateur radio service, including proposed new bands at 10, 18 and 24MHz.

The development of these goals and objectives was the first step. The next step, and a giant step indeed, was having those goals and objectives adopted by each of the three IARU regional organizations. Then it was up to each member society to go to its own administration and endeavour to have it endorse those principles. We didn't have the universal success in this phase that we would have liked, but enough countries included endorsement of the amateur goals and objectives in their pre-conference position papers, circulated to all other administrations, so that by the time the conference opened in September 1979 we had an encouraging amount of support. It was in fact a level of support that we had never before achieved.

And finally there came that day at the conference when G2BVN and I watched a dream come true!

Restructuring

Although no one disputed the fact that our preparations for WARC 79 had been exemplary, and that the IARU had been successful in its representation of the amateur radio service, there was a feeling on the part

*HC-60, Box 60, Waldoboro, ME 04572 USA.

of a number of people, particularly in Europe, that the decision-making had rested on the shoulders of too few people, and that the IARU ought to be more truly international. Because so many prominent amateurs were present in Geneva during the course of WARC 79, the then-president of the IARU, Noel Ealon, VE3CJ, took advantage of the opportunity to have a couple of meetings of those interested. These meetings led to the formation of a restructuring committee which eventually was expanded to include all members of the Executive Committees of the three IARU regions. After a substantial period of correspondence and exchange of views, it was decided to first modify the IARU Constitution by creating an IARU Administrative Council. This Council was to consist of two representatives from each region plus the three officers. The IARU membership was polled and ratified the proposal, and the Administrative Council then took over the task of completing the restructuring of IARU.

IARU today

The IARU you have today is structured in the following fashion. First, there are the member societies (currently 124) which are the base of all power in the IARU. They ratify the selection of the president and vice-president. They vote on the election of new members. At regional conferences they adopt the policies which will guide the operation of the regional organizations for the ensuing three years, and they elect the officers and executive committees of the region. They levy dues which finance the operations of the regional organizations and the regional participation in ITU conferences. We should mention here that not only do the member societies have the power base in the IARU but they also have heavy responsibilities. They are charged with the proper representation of the amateur service in each country, in a detail which is rather thoroughly spelled out in the new IARU Constitution.

In the three years between regional conferences, the regional organizations carry out the policies adopted by their members, with particular emphasis on the welfare and the representation of the amateur radio service. Further, the regional organization supplies two delegates to the IARU Administrative Council.

The IARU Administrative Council, meeting once a year (usually at a time and place adjacent to a regional conference), has the responsibility of charting the overall course of the IARU and ensuring that all policies and objectives are being carried out. The IARU Administrative Council has a particularly heavy responsibility in overseeing the IARU's preparation for any future ITU conferences that might affect the amateur radio service.

The International Secretariat is currently provided by the ARRL, and is responsible for answering the multitude of correspondence that results from the activities of the IARU and for providing logistic support for the IARU Administrative Council. In addition, the very substantial financial support provided by the ARRL in its role as the host society for the International Secretariat makes possible not only the activities of the International Secretariat but also those of the Administrative Council.

IARU tomorrow

In some areas of IARU operation we are still having growing pains. It seems that there are some modifications which might profitably be made to our fairly new Constitution and Bye-Laws. For example, the procedures by which the president and vice-president are chosen perhaps need to be modified. Such changes, and others, were discussed at the Region 3 conference in Auckland in November 1985 (John Allaway, G3FKM, Region 1 secretary; David Evans, G3OUF, RSGB secretary and chief executive; and Tim Hughes, G3GVV, RSGB IARU Committee chairman, were there) the Region 2 conference in Buenos Aires in October 1986 and probably again at the Region 1 conference which will take place in the Netherlands in the spring of 1987.

Incidentally, one of the most encouraging developments in the past few years, at least insofar as I am concerned, is the amount of inter-regional liaison that now takes place. It used to be that only people of the region, went to their respective regional conferences. But now, each regional conference invariably has observers present from other regions. Sometimes the observers are from an IARU regional Executive Committee, sometimes from an individual society. Whichever it might be, this business of liaison between the regions is another example of the IARU becoming more truly international. It means that when a topic of discussion comes up that could affect all three regions, generally all three regions are present and have an opportunity to participate in the talks.

Another general WARC?

There has been some discussion that there might be another General WARC in the offing, perhaps as soon as the early nineties. There's pretty general agreement that the amateur radio service doesn't want another WARC, but that if there is to be one, we'd better be prepared for it.

And so that's what we're doing — getting prepared.

How? First, by strengthening the IARU organization. That's why there has been discussion of further revamping the IARU Constitution, so that we will have an organizational instrument that will serve our needs, enabling us to concentrate our energies on other challenges. Second, by making sure that we're adequately financed to do the things that have to be done. We've already mentioned the appreciable support provided by the ARRL, and in addition the regional conferences have been examining their dues structures and making appropriate changes in order to meet the cost of ITU conference preparation. Third, by examining a set of proposed goals and objectives for a future General WARC, and that process is underway now through the regional conferences. Fourth, by undertaking an extensive programme of sending regional and international representatives to meet member societies and impress on them, *inter alia*, the necessity for close liaison with their administrations. Fifth, by continuing our programme of attending international telecommunications meetings so as to keep the IARU visible and to meet as many as possible of those telecommunications officials who may be the decision makers at a future ITU conference.

To those of us involved in the day-to-day, month-to-month work of the IARU, it is a fascinating organization. It was conceived 60 years ago as a dream in the minds of a small number of people who perceived the need for an international organization. It has grown until it has now gained some expertise in conference preparation, and it has the respect of people at all levels of the ITU. And yet, among the amateur fraternity as a whole it is little known, despite the fact that what the IARU does or doesn't do has a basic impact on amateur radio worldwide. We haven't covered all aspects of the IARU in this article, but we do hope that you will now have a slightly better understanding of it — and we hope that you will realize that *its* successes are *your* successes.



Members of the Square Bashers Expedition Group which was operational as GB2YS from ZR and YS squares during the Perseids in August (see report in VHF/UHF page 791). The photograph was taken during a sight-seeing trip to John O'Groats. L to r: G4VXE, G4FRE (whose article "An epitom keyer for beacon usage" appears in this issue), G4TTU, G3NYY, G4LXO, G8TFI and G8TVX

NEWS & VIEWS

VHF/UHF

Ken Willis, G8VR*

Aurora

With the current solar cycle at about its lowest ebb, any news of auroras is welcome. There was one in the early hours of 12 September, and there were one or two operators who were not in bed, and so took advantage of it. On 144MHz, Reg, G3UTS, (Co Durham), logged it from 0200 to 0600gmt, "maybe later but I had to quit, because they watch TVam!" From midnight Reg was hearing beacons GB3IER, (which peaked S9A around 0200), Y4IB, GB3ANC, SK4MPI, GB3VHF, GB3CTC and DL0PR, all tone A and all good strength, so the event was quite a good one. He worked LA6VBA (ES), SM6CMU (FR), SP5EFO (KM), OH5LK (NU), UR1RY (MS), UR2RQ (MS), UR2RAT (NR) and LA6OJ (CS). Reg heard only one other G and one GM, and said there was little activity, though the squares he worked would do justice to someone working the hf bands.

Another who was up and about early was Mel, G4XKZ (Dartford, Kent), who switched on his 50MHz transverter and copied GB3SIX with auroral tone. He sent me a tape recording of this signal, which is very interesting because it contains numerous T9 pings superimposed on the auroral signal, presumably from meteor reflections. Mel says that he is revamping his antenna system (currently a HB9CV on this band) so he is unable to give a precise beam heading, but believes he was beaming straight towards the beacon. Since GB3SIX beams to the west, the meteor reflections, Mel assumes, were back-scatter. GB3NHQ, in direct line-of-sight was S9 and T9 throughout. It is interesting to conjecture what might happen on 50MHz if an intense aurora situated over the Atlantic was "assisted" by strong meteor reflections to help bridge the gap between North America and the UK for long enough for information to be exchanged. The spacecraft picture of the aurora of 20 October 1981, shown in 4-2-70 May 1984 (though not too clearly) is an indication of an event which was situated well out over the ocean. If there was a land-mass to our west, we would undoubtedly make many auroral contacts in this direction. The 50MHz band certainly opens up possibilities since an aurora not intense enough to be effective on 144MHz may be quite workable on 50MHz, and conversely, a strong event on 144MHz should be very much more so on the lower frequency band. Incidentally the RSGB newscast for 21 September mentioned very quiet geomagnetic activity during the early part of September, until 12 September when a sub-storm suddenly developed, the A index reaching a level of 45 units. Readers have written to me saying that they find the solar information in the GB2RS news service "too technical". Some take the view that all they need to know is that "there is a likelihood of an aurora next Thursday". The needs of the vhf operator differ somewhat from those of the hf-band dx-chasers since the latter may regard an aurora only as an event which disturbs the ionosphere and ruins their dx conditions. Next month I will describe briefly the various terms used in these solar reports and forecasts, including the significance of critical frequency and muf, for the benefit of those who perhaps have recently entered the ranks of radio amateurs and who have not previously come across them.

In a very interesting letter from Alex Zaitzev, RW3DZ, (sec "Postbag"), he mentions a "radio experiment" commenced in 1983. He enclosed an introductory report on this study, written in Russian. If any reader would like to translate it (it is quite short), please let me know and I will forward a copy.

Meteor scatter

Paul Turner, G4IJE (Essex), has drawn my attention to an interesting meteor-scatter program published in *Dubus* 1/86 and written by DL5MCG. The program is in Basic and will run on most micros with only minor modifications. For a given shower, if specific information is entered such as date, ZHR, declination and right ascension (all of this information being

provided at regular intervals in *Dubus*), the program first indicates the probability of good reflections between a given remote location (ie a square entered by the operator), and then provides a histogram display such as the one shown in the illustration, which is an actual one for the Geminids next month. Note that in this histogram, the azimuth and elevation refer to the shower, not to the direction where you should point the antenna. Although programs such as this must only be taken as a guide, the information is based on the geometry of the path between both stations and the meteor trajectory, and from the illustration it would seem that since this is a week-end shower this year, one could safely take the family on a shopping expedition between noon and 5pm without missing too many good reflections. You can have fun with the program too, by inserting a phoney shower for 1 April (the "Spooftids") with a ZHR of 300, to see how easy it would be to make contacts through it. On a more serious note, by varying the declination and RA for a particular shower (which can be done on a micro though not in practice!), much can be learned about the significance of these two parameters to the meteor operator. If any reader cannot get access to the information printed in *Dubus*, I can provide it if you send me an a4 plus 40p in stamps to cover photocopying.

Computer print-out of Geminids shower. DL5MCG program courtesy of G4IJE and *Dubus* magazine

Hrs	Geminids	EL	N/S	Max Dec 13-14 ZHR 60	NE/SW	Radiant at RA 113, Dec 32	E/W	SE/NW
00	119	60	XXXXXXX	XXXXXXX	XXXX	XX		
01	143	67	XXXX	XXXXXX	XXXXXX	X		
02	177	70		XXXXX	XXXXXX	XXXX		
03	212	68	XXXX	XX	XXXXXX	XXXXXX		
04	238	61	XXXXXX	XX	XXXX	XXXXXX		
05	255	53	XXXXXXXXXX	XXXXXX	XX	XXXXXX		
06	269	43	XXXXXXXXXX	XXXXXX	XX	XXXXXX		
07	280	34	XXXXXXXXXX	XXXXXXXXXX	XX	XXXXXX		
08	290	25	XXXXXX	XXXXXX	XXX	XXX		
09	301	17	XXXXX	XXXXX	XXX	X		
10	311	9	XX	XXX	XX			
11	322	3	X	X	X			
12	334	-2						
13	347	-5						
14	359	-6						
15	12	-5						
16	25	-2						
17	35	2			X	X		
18	48	9	XX		XX	XXX		
19	58	16	XXXX	X	XXX	XXXX		
20	68	24	XXXXXXXX	XXX	XXX	XXXXXX		
21	79	33	XXXXXXXXXX	XXXXX	XX	XXXXXX		
22	90	42	XXXXXXXXXX	XXXXXX		XXXXXX		
23	103	52	XXXXXXXXXX	XXXXXXXXXX	XX	XXXXX		
24	120	60	XXXXXX	XXXXXXXXXX	XXXX	XX		

Paul, G4IJE, has asked me to remind ms operators that every Saturday and Sunday there is early morning activity on the meteor scatter random channel which is 50-350MHz for ssb operation. This conforms with the band plan for 50MHz and more people should use it, particularly GM and G1 stations whose presence would be much appreciated. Some of the bursts are so long that there is no need to use formal ms procedure, though its use will speed things up. One-minute periods are used on ssb on 50MHz as with other bands.

For the Geminids, G4IJE is trying to co-ordinate things so that there is maximum activity on 50MHz, and suggests activity should be concentrated on the period 2200 to 0600gmt over the period 11 to 15 December. More on this next month when details have been finalized.

Micro corner

In the September issue I bemoaned the fact that I used an Acorn Electron micro for which there was little software available, and asked if there were any readers who might help. Replies were received from G6LAW, GU2YH, GW4RWR, G1TF1 and G8PRH, all Electron users, and already it has become obvious that with a little co-operation and pooling of experience, this micro can be much more versatile than has been suggested, while its compatibility with the more popular BBC models is an advantage. More recently Amsat has confirmed that their "Satfoot" program will run without modification on the Electron, and facilities are available for using it as a word-processor at very reasonable cost. At current prices the less-favoured Electron looks to be a good buy, and there is no doubt it has one of the better keyboards among micros in its general price range. Chris Rudge, G6LAW, QTHR, has offered to deal with queries related to this micro, so please write to him if you wish to "join the club".

Incidentally, for those who work rtty using the "software only" method, they may have found that a large audio signal is often necessary to drive the computer. To combat this, Scarab Systems of 39, Stafford Street, Gillingham, Kent, have developed a filter, the NITE-2, which provides a high-level filtered output when driven by a noisier, low-level input from the receiver. Also it shows its paces when used ahead of conventional terminals. It is available either assembled or in kit form, and in a test I found it to be very impressive.

*6 Lertyn Gardens, Broadstairs, Kent CT10 3BH

Beacons

GB3RMK(50.060MHz from IO77UO) which was under repair is now serviceable again, but GM3WOJ reports that its temporary antenna is causing interference with repeater GB3BI which is on the same site. Chris would like to position the antenna for this beacon high up on a tv mast, also on site, but it may take some time for permission to be granted. Also from Scotland, GB3LER (144.925MHz from IP90JD) is understood to be fully operational, but not often audible in the south unless aurora is present.

Beacon organizer G3COJ also reports that GB3SUT (432.890MHz from IO92BO) started up again on 26 September using two eight-element Yagis in place of the original 8-over-8, beam headings being 0/135. The locator stated for this beacon is marginally in error; it should be IO92CO since the mast is in one square and the equipment in another! Comments are sometimes received related to the frequency accuracy of the UK beacons, operators asking whether they can be used as standards for checking their own equipment. To maintain accurate frequency is no mean task; some years ago the frequency of GB3VHF was regularly measured and the results transmitted. With the present large number of beacons operational, an overall service of this kind would be too costly. G3COJ says, however, that GB3VHF is seldom more than 200Hz off frequency, and usually on the low side when it is off, so for most purposes this would be accurate enough.

GB3WHA is still QRT due to the loss of the site. GB3WHA on 432MHz will move to a new location when one is found, and GB3WHA on 70MHz will be replaced by GB3REB (Medway Towns) as soon as possible.

Tim Hughes, G3GVV (Tonbridge), has sent a list of 50MHz beacons operational in IARU region 3; 25 are listed in JA, P29 (New Guinea), VS6, ZI1,2,3, YK0,2,3,4,5,6,7,8 and H44 (Honiara—this one not confirmed). The list is too long to reproduce here, but send me an aae plus 12p in stamps if you want a copy of it for your own records.

News is still awaited of the Malta 50MHz beacon, since some confusion exists as to the present situation. Also on 50MHz, OH1ZAA is ready to go with his beacon if authorization can be obtained, but he is not too hopeful that he will be successful in this.

Tropo

After a long wait, weather conditions contrived to produce some excellent tropo between 20 and 25 September, or thereabouts according to your location, when strings of HB9s were worked on 144MHz, and the path to OK and SP was good too. G4IJE had put a five-element antenna in his attic in order to keep a local sked, and was pleased to find that with only 10W he could raise OK and get a 57 report. One of the features of the opening was its long persistence, with dx being worked during the day when many operators were at work which reduced the usual QRM on the band.

As commented on before, we hear little of what goes on on the 432MHz band, though there is obviously much dx being worked there.

G2AHU mentioned in conversation that on 50MHz, where the sort of tropo conditions we expect on 144MHz are not supposed to exist, his reception of the GB3NHQ beacon was exceptional during the recent opening and varied from an "in the noise" signal to, at times, S9.

Going back a bit to 19 July, G1IRG reported having worked CT3BX/DK, "also worked by G4XEN and a few people down south" via tropo. He gives the QTH as IM12OQ which is certainly in the spot where one would expect to find a CT3 station, so was it a German visitor, and if so should not the call have been CT3/DK etc? Anyway it was excellent dx, which G1IRG measures as 2,530km.

Sporadic-E

There was a major Es opening on 144MHz around breakfast time on 20 September, very late in the year for this mode. Being a Saturday, there was much activity, most of the dx being provided by YU1, 2, 4, 7 and 8, HG and YO. Mick Cuckoo, G6ECM (Herne Bay), worked 21 YU, three YO and HG, plus an OE in an opening which lasted for some two hours. Mick said that he moved away from the calling channel where enormous QRM resulted from pile-ups, and found himself virtually alone around 144.250MHz where he was called repeatedly, and heard YUs calling CQ in vain with no replies. There is a moral here for Es operation—try to stay away from the main action. I found much the same thing down at the cw end where there were many dx stations calling "CQ".

It was an interesting period all round. Although we do not understand the mechanism of sporadic-E, it may be relevant to note the geomagnetic conditions which existed at the time. The GB2RS newscast reported that the sunspot count was zero, but geomagnetic activity was unsettled and at times reached sub-storm levels (remember the aurora of 12 September which was a big one, observed visually in the USA as far south as the state of New Mexico). Charlie Newton, G2FKZ, says that this sort of activity is quite common around the equinox.

The 50MHz operators were quick to notice the sporadic-E on 20

September and much crossband activity was observed. It is encouraging to note that well-known 144MHz dxers such as YO2IS and DL7YS, to mention only two, are prepared to forsake 144MHz during these good conditions to provide dx contacts crossband for the UK operators on 50MHz. I think that we owe a great deal to these enthusiasts, for otherwise inter-G working on this band might soon pall, which would be a great pity.

Paul, G4IJE (Essex), has made a list of all his sporadic-E contacts on 50MHz which took place between May and September this year. The list covers both two-way and crossband working, and includes stations heard but not worked. Paul reports many tv signals heard but not identified, and said also that he heard beacon ZB2VHF on many more occasions than he has included in his list. Es activity on 50MHz occurred on no less than 43 days in the period (a very good correlation with OH1ZAA's estimate of "every third day"). This log has some comments which illustrate the potential of the band, such as "QSO with LA6QBA lasted 90 minutes", and "one hour QSO using fm". This list will go to Ray, G2AHU, who is to continue his co-ordinating activities in reporting the 50MHz scene as he did earlier when the initial "50MHz experiment" was being assessed.

In a recent letter, Andres, EA7AG (Almeria), said that sporadic-E in his part of the world was "very disappointing this year" with few openings, all of them very short, one to Greece and a few to YU and I. However, there were some good tropo openings, to compensate, to I and EA8, and he says "reflection to Algeria". Incidentally, Andres will be in London between 2 and 15 November; contact me for details if you want to get in touch with him.

Repeater news

Chris Young, G4CCC, sent me a copy of RSGB (RMG) *Repeater Report* issue 86/2, the second to be published this year and which is aimed at groups rather than users. It contains much information of an administrative nature, and Chris suggests that groups wishing to have information included in future reports should write to him QTHR.

Extracting some information from the report, we learn that currently with the DTI are proposals for channel changes for GB3HO (RB14 to RB1), GB3HU (RB10 to RB3), GB3NH (RB14 to RB3), GB3NM (RB6 to RB8), GB3NX (RB2 to RB8) and GB3TH (RB13 to RB15). Site changes with the DTI currently are GB3s HO, KB (Biggin Hill), KN (Maldstone), LN (London North), WS (Horsham), DT (Dorset), VR (Worthing), VS (Bridgewater) and PD (Peterhead). Fourteen proposals for packet radio repeaters, all scheduled to use AX.25 Level 2 protocol are also with the DTI.

The RMG has accepted in principle a proposal for a 1.3GHz tv repeater at the Emley Moor site with call GB3ET, as was a proposal for a 144MHz repeater at Aviemore (GB3IB), and a 432MHz repeater to cover outlying areas around Aberdeen (GB3BA). A proposal for a vhf system for Wisbech has also been discussed by the RMG.

At a meeting between the RMG and the DTI in July, the following licences and site changes were approved.

- GB3NG (Peterhead, R1—licensed)
- GB3SA (Swansea, R3—licensed)
- GB3EL (East London, R0—site change)
- GB3SR (Sussex coast, R7—site change)

At the time of the report there were no firm dates for operation, though it was hoped that it would not be long before permission was granted, especially as the RMG has been pressing hard for a more streamlined procedure for licences and site changes.

The RMG proposes an open meeting soon in the South West, and requests suggestions for a venue which is reasonably accessible. Please contact G4CCC in this connection.

The report touches on the problem of jammers and pirates, and says that the DTI has asked the RMG to co-operate in gathering essential information. A voluntary organization, the Amateur Radio Observation Service (AROS) is involved in this task and encourages anyone with a problem or with specific information to contact them giving, in the order stated:

- Dates, times, frequencies.
- Calls, names, addresses of others who heard the interference/offence.
- Signed statements by the above which include positive identification of the sources of the trouble, and stating how the identification was made.
- What action, if any, has been taken, and with what results.
- A tape recording of the situation if available.

AROS can be contacted by writing to RSGB headquarters.

Finally, for hf enthusiasts, the DTI will receive proposals for three experimental repeaters on 29MHz for a limited-duration experiment. They are GB3CC (Cannock), GB3EY (Emley Moor) and GB3HF (Davenport), all on 29,580/29,680kHz. For further details of these, contact Geoff Dover, G4AFJ, QTHR.

More expedition results

Summer already seems long past, but a very detailed report from the Square Bashers Expedition Group brought back memories of it. This year's sortie was their fifth expedition to activate some of the rarer squares, and this time they spent a week near Peterhead (ZR), followed by a similar period near Wick (YS). Bands used were 50, 70, 144, 432MHz and 1.3, 2.3GHz, plus hf operation, altogether a very ambitious undertaking. A total of 1,007 contacts were made (including those on hf bands), and as well as tropo, the group worked meteor scatter and was fortunate to catch an Es opening on 14 August when in YS square when DK5RV (GI) was worked on 144MHz and SP9 heard. Best dx from either square was 1,921km on 50MHz, 787km on 70MHz, 2,204km on 144MHz, and 975km on 432MHz. Five element antennas were used on 50 and 70MHz, 2x9 elements on 144, and 4x16 elements on 432MHz. Meteor scatter conditions were good from ZR, but from YS, the peak of the Perseids was not as intense as had been expected, though plenty of contacts were made. One contact was of great interest, with SM2CEW (LZ), since he could be heard throughout the period with strong ms enhancement on the signal, and the group could not account for the mode of propagation. If any proof were needed of the potential of 50MHz for ms work, a contact with G4IGO on this band yielded a burst of 2.5min duration. They advocate 2.5min periods for random cwms for next year, and as mentioned last month, this is clearly something which has to be sorted out soon, otherwise the use of both 2.5 and 5min periods on the random frequencies will result in chaos. The group is thinking of going to YG square next year where the weather should be warmer and the wine certainly cheaper than in Scotland. Thanks to Jon, GW4LXO, for an excellent report, and to GW3NYY, GW4TTU, G4VXE, GW8TVX, G4FRE and G8TF1 who made up the team.

Contest calendar 1987

Jochem Fischer, DH2NAF, of PO Box 1101, D-8078, Eichstätt, W Germany, has asked me to say that his publication *All European VHF/UHF-SHF Contest Calendar* is an 80 page booklet giving full details of more than 450 European contests. Written in English, it gives addresses to which entries should be sent and individual contest rules, and would appear to be something which every club should have available for its members. The 1987 edition, which should be available by the time this appears in print, can be obtained by sending Jochem two ircs or US\$1 to the address given. I have a copy of the 1986 edition and can certainly recommend it to contest "buffs".

From the postbag

Max Wild, DL4MDQ (FT18j) is fully QRV for 50MHz crossband and on 50MHz has a six element (tv Channel 2, centred on 51.0MHz) a BF981 preamp and a Spectrum 50/144MHz converter into a FRG9600 "final receiver". The antenna can be rotated separately from other antennas at the station and on 5 September this monster array received GB3SIX at 599 and GB3NHQ, also 599. The GB3SIX signal is something of a surprise considering that it beams west, but the mode was sporadic-E on this occasion. Max wants 28/50 or 144/50 crossband skeds, and suggests that anyone interested either looks on the 3,645/14,345/28,885kHz nets, or telephones him during the evenings on 08456 7309. The QTH for those who prefer to write is Schlenkensteinstr 8, 8073 Kösching, W Germany.

If you look at the old-style squares map you'll note that squares BN and CO are in the North sea. G4MJC (Eastbourne) activated these during a holiday afloat and worked several G stations from BN and some Dutch stations from CO. He is planning next year to activate some more "wet" squares, notably BM, BN, CN, CO, DO and DP, working all night going one way, and again the following night in reverse order. On another topic, he wonders whether some system other than producing a QSL card could be found to confirm a contact, eg certification by locals hearing the contact. This plea arises from the fact that he has worked 170 squares on 144MHz but has only 135 confirmed, and as he says, he is in a desirable square (AK), and some of the missing ones are not exactly locals but include EA, LZ, I7, I8, HG, CT4 etc. He has similar problems on 432MHz. He has sent 4 or 5 cards direct to RA3YCR but still lacks a reply. I have always found the Russian stations to be excellent at sending QSLs, but they often take a long time. The system I use I have described previously; send one or two ircs to those you want most of all, also enclose an envelope addressed to yourself. Then, all the recipient has to do is to write out a card and slip it into your envelope. Next time he goes to the post office he can cash the ircs and stamp the envelope. Our addresses can be very confusing to someone overseas who speaks a very different language. It has worked for me. I have 98 per cent of my squares worked confirmed, and some of the calls listed by G4MJC as being offenders are represented by cards in my collection, so I think the system works. □

HF

John Allaway, G3FKM*

IT HAS ALWAYS surprised me that so many enquiries about amateurs who are no longer on the bands or are now living in other countries result in their location when they are published in this column. An unusual request has arrived from David Norris (4463 Sunnymead Av, Burton, Michigan, 48519, USA). He recently spent some time with Walter Lord, author of *A Night to Remember* and is trying to locate Harold Bride, wireless operator of *RMS Titanic*. So far he has been traced up until about 1922. Can any reader help please?

Many top-band users will have been familiar with the potent signal put out by PA0PN. G2HKU has passed along the sad news that Piet has recently become a silent key following a brief illness. Piet has kept weekly schedules with Ted since 1953 when he was first allowed on the band "to test out the Dutch flood warning transmitter". He had a distinguished career during the second world war and was decorated for his work in the Resistance Movement.

Following the claim (in the September column) by GM3HBT to the first GM-EA6 QSO on 10MHz, GM4FDM has claimed an earlier one—at 1820 on 9 March 1986 with EA6WX. Are there any other claims please?

DX news

Rumours abound concerning likely (or unlikely) activity from Mt Athos. One of these is that one or more of the resident monks has passed his licence examination. A great deal of confusion and intrigue seems to have accompanied recent expeditions to Athos—most of which seem to have failed to actually appear at the stated time or from the stated place!

UA1OHL is a new station from Franz Josef Land and has been worked at the low end of 7MHz on cw. JX8KY will be on the air throughout the winter initially on 14MHz with a five-band beam and later on lower frequencies with wire antennas. JX5AG has been worked on 14MHz cw.

YB18AR is the callsign used to celebrate the 18th anniversary of ORARI, the Indonesian society. From Nepal a new operator, 9N1MC, who is the chief engineer in the Ministry of Communications, may be found almost daily on the RF0FWW net on 14,195kHz at 1100. Father Moran, 9N1MM, is reported in US news sheets to be on the air between 14,175 and 14,240kHz several days weekly from 0100. A new station is also on the air from 9M6, this is Don, 9M6AE, who received his licence on 28 August and who at the time of writing had only a wire antenna but hopes to be using a beam soon.

DXpress says that QSOs with TY9ER made on ssb in the early 'eighties were genuine but that the "TY9ER" active on 7MHz cw is a pirate according to DL8BC who is TY9ER's QSL manager. From Uganda 5X5MB is said to be active almost daily on 14MHz ssb. However, there is a rumour that amateur radio was to be banned in Uganda. TZ6WC, from Mali, is often to be found on Saturdays and Sundays after 2200 on or near 14,245kHz. TU2BU, who used to be TR8AC, is near 14,180kHz most days from 2000.

ZD8SW is on 14,200–14,215kHz most days after 2000 and will be on other bands soon. He is Stuart, G0DFW, who will be on Ascension Is for two years on a tour of duty with the BBC. ZD9BV was expected to be on the air from Gough Is beginning on 6 October for an unspecified period.

K7CA will be K7CA/KC4 from McMurdo Sound, Antarctica, from October until January 1987 and he is expected to be active on the lower frequency bands.

Overseas news

Ernie Sumption, G3DQL, faced a number of hazards during his recent visit to The Gambia. These included confiscation of his gear at the airport, electrical storms, and a mast brought down by torrential rain. In spite of this he managed to make 496 QSOs as C65/G3DQL—68 of which were with the UK. QSL cards were to be with the bureau by the end of September. Ernie's son Pete now has the callsign C35GP and should be heard on ssb by now.

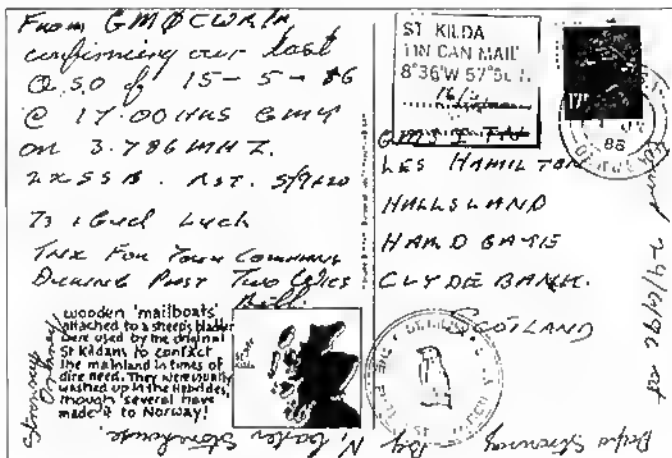
Welcome . . .

. . . to the following new overseas members of the Society who joined during August: EA1YV, E15CRC, G3WZM(ON), G8SYV(DL), YD6KGE, 3D6BQ, and T Dube (Z2), R Blackman (VK2) and K Schneider (DL).

*10 Knightlow Road, Birmingham B17 8QB



This interesting QSL despatched by G4CWRIP from St Kilda by Tin Can Mail
—dropped into the Atlantic and found near Orkney!



Expeditions

According to *DX press*, KD7P, who hopes to visit Peter I Island around Christmas time, will be travelling on the world's most powerful non-nuclear ice-breaker the *USCGC Polar Sea*. This ship has helicopters and Bob is said to have negotiated a landing attempt with the ship's captain. There is, however, believed to be some problem over a first landing on the island since 1929 being made from a US Navy ship with consequent claims to sovereignty.

The European DX Foundation has been formed and has the provisional executive members consisting of HB9HT, DK9KD, DL1LD, DL3RK and OZ1LO. Its main object will be the support of expeditions, concentrating particularly on European needs or to those willing to activate a really rare dx country anywhere. The membership fee is DM25, and full information is available from Dieter Loeffler, DK9KD, Wildenburgrasse 17, 5000 Köln, FR Germany.

DX News Sheet says that plans are being formulated for an operation from Palmyra Is and Kingman Reef during September 1987. Those involved are said to be DJ8NK, F6EXV, W0RLX, K8CW and WA2MOE. Another possibility is a visit to Spratly Is by this group, plus SM0AGD, in October 1987.

KX6DS hopes to be on the air from the Federated States of Micronesia (KCG) for about a week commencing 22 November and taking part in the CQWW DX Contest with activity on ssb and cw from 1.8 to 28MHz.

The Australian Government will be commencing regular scientific visits to Heard Is soon. At present there is no news of any planned amateur activity other than the fact that VK9NS is interested in making the journey again.

GM3YOR was expected to be in Sri Lanka from 21 October to 5 November and on the air as GM3YOR/4S. He favours cw and will be found mostly around 3,503, 7,003, 14,033, 21,033 and 28,033kHz.

Contests

Results of the 1985 CQWWDX Contest (Phone) have now appeared in CO and UK scores are as follows:

SINGLE-OPERATOR, SINGLE-TRANSMITTER					
Call sign	Band	Points	Call sign	Band	Points
GW4BLE	All	3,221,380	G6NK	All	7,740
G3SJX	All	590,924	G4GIR	All	2,520
G3SNN	All	580,682	GM8SO	All	1,710
GM4GPN	All	425,530	G4MBC	All	108
GM3BCL	All	260,459	G4RKK	21MHz	64,152
GM4WEW	All	143,850	G0AEV	21MHz	57,026
G3UDU	All	124,100	G3JKY	21MHz	7,920
GM4JFS	All	119,006	GM0AXY	21MHz	1,219
G3TXF	All	67,792	G3FXB	14MHz	1,217,178
G4ZFE	All	58,674	G4RFE	14MHz	29,370
G3ICG	All	37,818	G4DRS	14MHz	144
G4OKN	All	34,440	G3VZT	7MHz	123,165
G4BWP	All	23,115	G3RRS	7MHz	121,000
GM4CUX	All	17,933	G4IUF	3.5MHz	60,183
GD4GWO	All	14,439	G4OBK	1.8MHz	15,008
GJ4TXB	All	9,798	G3XWZ/A	1.8MHz	7,967

Certificate winners are listed in bold type.

In the multi-operator single-transmitter category GJ6UW led with 4,430,010 points followed by GW8GT (4,155,624), G3LNS (3,206,249), G3SSO (1,241,825), GB2AA (968,108), GM0BRS (842,420), GU/PA2FAS (392,948) and G3YMM (61,755). G3CWLIA scored 928 points on 21MHz in the QRP Section.

All Austrian Contest

1800 15 November to 0700 16 November
1,810-1,950kHz cw only. Exchange RST and serial QSO number (from 001). Each QSO counts one point. Each Austrian district (OE1-OE9) counts as two multipliers, each Austrian district locator one, and one for each other prefix. Send log details and declaration to OVSV-AOEC 160M Theresienstrasse 11, A-1180 Vienna, Austria, and post before 31 December. Official stationery is available from OVSV (see and lrcs please).

OK DX Contest

0000 to 2400 9 November
1.8 to 28MHz Cw and phona but no cross-mode. Exchange RST plus ITU zone (UK is 27). A station may be worked once per band. Three points for working OKs and one for all other OSOs. The multiplier is the total number of ITU zones worked on each band added together. There are single operator, single and multi-band and multi-operator multi-band categories. Submit separate logs for each band and show date, time, station worked, numbers sent and received, and show if new multiplier. Enclose the usual signed statement and post by 31 December to CRCC, PO Box 69, 113 27 Praha, Czechoslovakia.

Awards

Algoa Branch Award

For those with proof of OSOs with at least four of the following categories: (1) Any member of the Algoa branch of the SARL operating in the Eastern Cape, (2) ZS1, ZS2, ZS4, ZS5, or ZS6, (3) ZS3, (4) H5, (5) S4, (6) S8, (7) V9, and (8) 7P, 3D6, or A2. All OSOs must have been made on or after 1 January 1986 and may be on any mode. The Award is free. Send application, with QSLs, to Awards Manager, Algoa Branch Award, PO Box 10050, Linton Grange, 6015 Port Elizabeth, Rep of S Africa.

The Golden Wings Award

To celebrate the golden jubilee of RAFARS and the Cleveland ARTS. Open to licensed amateurs and listeners who must work or hear 21 RAFARS stations—live of which must be located in Cleveland, Durham, or Tyne & Wear counties. A QSO with the Cleveland RAFARS station G3PSG must be included. The award will be issued from 1 December 1986—the starting date for eligible contacts. Send log details—station, date, time, frequency, and mode—and this must be countersigned by a RAFARS member. Enclose full name, address, and call sign, plus £1.50, to G3PSG, Cleveland RAFARS, 64 Churchill Drive, Marske by the Sea, Redcar, Cleveland.



The first home-built station in Turkey—owned and operated by Ahmet Aybirek, TA1P, from his home in Istanbul

QTH CORNER

A35KL	J R Lockhead, ZL4QS, The Balloon, RDI Kaitangata, New Zealand.
C30DAG	G Thijss, ON4TJ, Bieugelloon 61, B-9720 De Pinte, Belgium.
C30DAJ	
C30DAK	
F00XA	
J73A	F6GBX, J Calvo, 8 Rue Messager, F-91240 St Michel sur Orge, France.
TAIP	N6CW, T Bakler, 4639 Katheine Pl, La Mesa, Cal, 92041, USA.
TU2BU	Ahmet Aybirtok, PO Box 33, Istanbul, Turkey.
TZ6WC	A Curley, Dept of State-Abidjan, Washington, DC, 20520, USA.
YB18AR	DL4BC, K Breitfeld, Merziger Str 37, D-2800 Bremen 44, FR Germany.
5N0ELT	via QSL Bureau, ORARI, PO Box 96, Jakarta 10002, Indonesia.
	S Kennard, G4OHX, 15 Shullie Close, Sidcup, Kent DA15 8EP.
5T5SL	DL8DF, R Schoeneberger, Graacherweg 10, D-6600 Saarbruecken, FR Germany.
9N1MC	Kilshna Khaliy, Ministry of Communications, Kathmandu, Nepal.

1986 ALL-BAND TABLE NO 4

	1-8MHz	3-5MHz	7MHz	14MHz	21MHz	28MHz	Total
GM3YOR	48	80	104	56	41	31	360
G4OBK	56	44	73	82	45	34	334
GW4RHW	-	35	101	98	48	34	316
G3TXF	44	40	43	104	37	21	289
G4ODV	44	32	65	60	53	25	279
G4ZCG	-	74	56	64	43	20	257
G4GOF	2	8	23	35	33	32	133

Next deadline for this table: entries to reach G3GIQ by 15 November please.

Band reports

Rather a poor month, which has been reflected in the much reduced number of reporters who found the better weather more attractive than the bands!

However, the following did send in logs which are much appreciated: G2HKU, G3YY, G5JL, GM3CSM, G3s GVV, KSH, PJT, PXT/M, YRM, G4EHQ, GW4KGR, G4s, MUW, UOL, UZN, G0sAEV, AGP, and RSs 10906 and 30144.

Stations listed in italics were using A1A.

1-8MHz. 0400 W2, W3, W4. 1900 HB0/DL1GK, OYIDF2PI, SV1PL, 2100 CT1AOZ, F8IIEA, UA9AOV, UL8LWQ, UZ9CWB, 2200 RL8PYL, UG6GAW.

3-5MHz. 0200 ZF1C, 0300 WA2UDT/KP2, T1SEWL, 0500 LU4FC, OA4ZV, PP7IE, 0600 C30DAG, ZL1AIZ, 2000 JA4DND, 2100 C30AAN, EK9AD, JA6s ELD, IEF, UF6FB, ZB2AB, 2200 K1GUP, N2RM, QY2J, VK6HD, 9H1EL, 2300 OHOAM, U180AA.

7MHz. 0100 J37AH, 0500 FM5CW, HK, LU, PY, PZ, W6-W7, XE2NNX, ZF2JU, ZL1ZL, ZS5LB, 0600 HK0BKX, OA4ZV, VK2AVA, VK9NS, VP2VA, ZB2B, 9Y4COR, 0700 CO2VC, CP4DR, OA8AAQ, VK2, ZL3CQ, 1700 LXIDF5BM, 1900 UV10Q, 2100 JA5BJC, TR8JJ, 2200 H18LC, HZ1HZ, U19HZ, VP8PTG, 2300 ZA2AOP(?), 4X6FH.

10MHz. 0500 ZC4EE, 0600 VK3sBXN, XB, VK6, ZL1TN, 0700 VK3, VK5, 1100 HB0/DL1GK, 1500 LX1KH, 1600 9M2s FP, FS, 1800 JA1FF, 1900 CU2AR, W1AQE, 7X2AX, 2000 W2, 3, 4, 9, 2100 TK/HB9ASZ, 2200 FG5AM, FG7XC, ZS6USH, 5N0BRJ, J6LAD/9Y, 2300 NP4AT, W8EGB.

1986 28MHz COUNTRIES TABLE

G3XQU-97	G0AGB-71	G3BXM-31 (ORP)
G4JBR-94	G0DNV-69	GD3SVWA-27 (cw)
G3VOF-94	G4MUW-65 (ssb)	G4YWG-17
G0AEV-89	G0DXW-44	G4LZZ-5
G4XAH-79	G4OBK-43	5B4DN-2
G4RAB-74 (ssb)		

HF F-layer propagation predictions for November 1986

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie 0=0000, 1=0200, 2=0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1-8MHz openings are indicated by a plus (+) sign in the 28 and 3-5MHz columns respectively.

Time / GMT	28MHz		24MHz		21MHz		18MHz		14MHz		10MHz		7MHz		3-5MHz	
	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802	000001111122	024680246802
** EUROPE																
MOSCOW			..21..		..3542..		..5775..		..189983..		11.6666782..		774543346867		++52...3++	
MALTA			..121..		..3541..		..6777..		..288888..		24275666511		998643346887		++3...4++	
GIBRALTAR					..3321..		..26553..		..788881..		..2.2866686..		787754345875		++2...25+	
ICELAND					..11..		..2431..		..16875..		..677784..		34.165457762		+++32.245++	
** ASIA																
OSAKA			..12..		..163233..		..2..		..61..		..163233..		..131124431		..24..	
HONGKONG			..12..		..34..		..572..		..165..		..144332..		1...1124544		..243+	
BANGKOK			..222..		..454..		..1676..		..2566..		1...24321		2...1124463		..255+	
SINGAPORE			..232..		..5652..		..16774..		..246661..		1...143461		1...1124664		..253+	
NEW DELHI			..232..		..565..		..2676..		..34663..		2111133421.1		73...1124668		4...25++	
TEHERAN			..3321..		..15553..		..36775..		..555672..		432322346212		8731...124678		4...4+	
COLOMBO			..3321..		..15633..		..25776..		..233673..		1...2346212		41...124678		3...4++	
BAHRAIN			..3331..		..1564..		..36676..		..534673..		543211346213		972...124778		4...4+	
CYPRUS			..2221..		..4443..		..488884..		117667881		775643467645		996311135888		++3...25+	
ADEN			..2111..		..4333..		..155661..		..355783..		1...433377..		6.32...246422		942...14778	
** OCEANIA																
SUVA/S			..1..		..431..		..7521.2..		..1127653161..		..344431..		..311242..		..4++	
SUVA/L							..22..		..3553..		..255333552..		..321.132..		..4++	
WELLINGTON/S					..1..		..3..		..11.631.141..		..254433..		..131.1241..		..4++	
WELLINGTON/L					..121..		..454..		..27666..		..1235322442..		..131.132..		..4++	
SYDNEY/S					..1..		..13..		..5521.21..		..6433263..		..212441..		..23..	
SYDNEY/L					..3321..		..15633..		..356673..		1...123346211		..3111351..		..2..	
PERTH							..27776..		..356673..		1...123346211		..123346211		..44..	
HONOLULU							..27776..		..356673..		1...123346211		..311242..		..24..	
** AFRICA																
SEYCHELLES			..1111..		..3333..		..155671..		..355783..		1...323577..		612...246523		831...14788	
MAURITIUS			..2222..		..4444..		..166672..		..355784..		11.323577..		641...246523		73...14788	
NAIROBI			..223..		..44451..		..166683..		..355686..		..4323681..		6432...136733		972...14788	
MARARE			..12341..		..24572..		..56786..		..255688..		..2.4323583..		6723...14788		972...14788	
CAPETOWN			..1453..		..13673..		..35787..		..1436781..		1...3323465..		6723...14788		972...14788	
LAGOS			..24564..		..46676..		..77778..		..1436781..		4...3323465..		6723...14788		972...14788	
ASCENSION Is			..14434..		..26356..		..576681..		..745673..		..32.4333462..		588241...1576		89951...279	
DAKAR			..4444..		..16666..		..477781..		..676674..		..22.753572..		588552...2575		88962...279	
LAS PALMAS			..2222..		..15544..		..37777..		..688882..		..218767771..		587675445775		999842112589	
** S. AMERICA																
StH SHETLAND			..11..		..1223..		..344361..		..566663..		..22.7655451..		366453321222		345431...11	
FALKLAND Is			..1133..		..3255..		..165771..		..476663..		..22.7653341..		47846321.122		377631...2	
R DE JANEIRO			..1..		..3113..		..63451..		..175453..		..12.5633341..		478463...233		88973...25	
BUENOS AIRES			..1.3..		..2215..		..154461..		..375533..		..12.7643331..		3783641.122		789731...2	
LIMA			..111..		..322..		..6551..		..7632..		..14321..		1341.231...11		588511...11	
BOGOTA			..1.1..		..222..		..5441..		..7552..		..1264321..		112.4331.21		6774311...2	
** N. AMERICA																
BARBADOS			..111..		..322..		..16451..		..47553..		..653341..		113.443...132		777531...15	
JAMAICA			..111..		..343..		..4642..		..6632..		..464331..		11.3332.21		6663311...3	
BERMUDA			..11..		..3441..		..4642..		..6632..		..464331..		11.4321231		6662311...25	
NEW YORK					..133..		..3651..		..3651..		..233233..		5542111...24		++4...2	
MEXICO					..42..		..2442..		..3651..		..21341.1..		3541311...1		++4...2	
MONTREAL					..132..		..3551..		..56641..		..334333..		554.2111124		++4...2	
DENVER					..14..		..463..		..56641..		..4322..		352.2.111.1		++4...2	
LOS ANGELES					..1..		..463..		..56641..		..4322..		142.31121..		++4...2	
VANCOUVER					..1..		..463..		..56641..		..4322..		241.1123111		++4...2	
FAIRBANKS					..1..		..463..		..56641..		..4322..		22.31124421		++4...2	

The provisional mean sunspot numbers for June, July and August 1986, issued by the Sunspot Index Centre, Brussels, were 0.8, 17.8 and 7.4 respectively. The maximum (a) and minimum (b) daily sunspot numbers in those months were: (a) 8 on 10 and 25 June, (b) 0 on all other days except 1 June; (a) 36 on 12 July, (b) 0 on 1, 2, 24, 25 and 26 July; (a) 14 on 23 August, (b) 0 on 10-15, 18, 19 August. The predicted smoothed monthly sunspot numbers for November, December, January and February are respectively: (classical method) 5, 4, 3 and 2; (SIDC adjusted values) 3, 2, 1 and 0.

14MHz. 0600 SV1DO/SV5, ZS6RM. 0700 A35KL, BY1QH, C56/G3DQL, KH6IJ, KL7PJ, VK9ND, Y1BGD, SM6JZ/5B4, 0800 HZ1HZ, JA, AH6DL/KL7, KX6DX, SV1DO/9, UV100, VK6, ZK2JB, 9L1JW, 0900 C30AAN, KX6AX, QY6FRA, 1000 HV1CN, UZ4HWK/UL1, 1100 TA1A, ZL1NT, 3D2DW, 1200 OK1XCJT, 9N1MC, 1300 J40DX, HL86CG, 9N1MC, 1400 BY4AA, JAS, ZS2MI, 9M8GH, 1500 HL9OB, VU, W6-W7, ZD7CW, 9M2CW, 1600 TA5B, V85GA, VQ9GB, 3B8FP, 4S7PVR, 8Q7CH, 9V1TL, 1700 DX9C, KL7KJ, 1800 A92C, AP2AM, 1900 BY1OH, DP0GVN, VE8DX, VP9J, 2000 VP2EZ, 8P9AF, 2100 AH2AN, HH7PV, VS6CT/KP2, ZL3AFT, 2200 QY7XA, TK9AA, VK2, VK5, W6-W7, XE1RC.

18MHz. 0800 DL, SM, Y, 1500 LU1DOW, LU6UO, 1900 PY7ZZ, 2000 LU1DOW, 21MHz. 0800 JA, NY6MI/KH2, SV1JG/SV5, ZS5EXP, 0900 A22BW, TK5CF, 1000 DU9RG, SJ9WL, VU2ZAP, YC0GV, VE2PAB/4U, 1100 DU9DAN, 1600 OY6NS, OE5JTL/YK, 1700 5H3CM, JG1FVZ/5N0, 1800 D68WB, JY9RL, OA4ZV, VP8s BKT, WTW, 8R1OJS, 1900 LU, PY, VP8QP, 3G3T, 5H3MO, 2000 CE3HXZ, CX, FM4DN, HK, J88AB, PY, VP8RAF, YW1A(=YV), 9H4A, 2100 FE6HER/CE3, 2200 W1-W4, 2300 HR1FMH, VE2PAB/4U.

24MHz. 2000 SM, 2100 LA, 28MHz. 0800 CT, UO, TX2ED, 1100 UZ9CWW, 1300 TA1A, 1500 CE, PY, 1700 CX, SP, UB, 1800 PY, 1900 TZ6FK, 2000 CE3HF1, LU, Europe, 2100 LU1HOO.

Thanks are also due to the following for items extracted: *The Ex-G Radio Club Bulletin* (G130EN/W6), *Long Skip* (VE3IPR), *Linux DX Group Bulletin* (EA2IGO), the *DX Family Newsletter* (JH1KRC), *DXpress* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX) and *DX News Sheet* (G4DYO).

Closing date for receipt of material for the January issue is 27 November.

SWL

Bob Treacher, BRS 32525*

HF chatter

Robert Small, BRS8841, summed things up succinctly enough this month when he remarked that as we enter another dx season, so the bands at last have shown some signs of improvement. However, suffice to say, the process is a bit up and down. One day may be very good with dx audible most of the day, stations from W6 and W7 in the afternoon, the Far East well represented as we enter the early evening, and stations on the band after midnight. We are of course discussing 14MHz. Exactly the opposite might be the case the following day, with little to raise the hopes of even the most fervent dxer. It is always well worth monitoring the band, as even on what sounds like a poor band there is always something to keep the listener interested. At the time of writing, the WAE SSB Contest had taken place. Not much time for listening at this QTH, but even the odd 30min tuning 14MHz produced several rare oblasts from the USSR, some interesting special calls from around Europe and some Far Eastern dx; some of the signals from HL being particularly good.

As we head towards the dx season, there is good news for the swl in terms of up-and-coming dx. We should have already had some mouth-watering tasters; trips to Sable Island and Clipperton should already have happened. In the pipeline: there is promised lower frequency activity from K7CA/KC4 (McMurdo Sound); the news that regular scientific trips to Heard Island should increase activity from there, and that there should be increased activity from the Pacific during the CQWW CW Contest.

DXNS had some worrying news for swls who have sent cards to ZL1AMO for recent expeditions. He apparently does not QSL any swl report he receives via the bureau. If you need that all-important card for past dx trips which ZL1AMO has monitored, check your records and send another card direct. Those hearing that station on his recent trip to Christmas Island (VK9X) will obviously wish to note and take the appropriate action.

Not too many hf reports this time, but Robert Small sent his usual first-class effort, which always makes me wish I took more interest in the hf bands in late summer. Mentioned were BY9GA, T32AN and 7J1ACH from Minami Torishima, and JR2HTU/JD on the sister island of Ogasawara. Additionally, Robert noted HC1MD/8, KX6AX, ZD9BH, ZK2JB, 3C1MB, 3D2QU and V31PC. Of the special prefixes mentioned in his report, 5J3LR (HK), DX9HT (DU) and C4LWF (5B4—from the Limassol Wine Festival—I hope the verification takes the form of a free sample!) were the more impressive. David Whitaker referred to several good openings on 28MHz, but no-one had much to say about 21MHz. Graeme Casellon, RS44984, heard A35NP (G4TAW of "Operation Raleigh" fame). HL86CG was mentioned by two reporters, including my xyl, and others mentioned 8O2FTJ (QSL via A22TJ). Moving to the lower

frequency bands, most reports mentioned the reappearance of some strong USA east-coast W and VE signals on 3-5MHz, and, nearer home, several French islands were active mainly to give contacts to the Islands on the Air chasers—FF6KED/POM, TK0KP/SAN and FF6KQG/CH. Few swls chase islands as a pastime. There is an extensive award programme run on the Society's behalf by G3KMA. IOTA directories are available to swls interested in finding out more about the programme by sending a large sac and a cheque for £1.50 to G3KMA. The best on offer on 7MHz appears to have been TJ1PR, while on 1-8MHz, one reporter mentioned a new country in the shape of HG6N, the Hungarians just having been given the use of the band on cw only.

Low-cost receiver

My attention has been drawn to a product offered by C M Howes Communications which will be of particular interest to the newcomer. The Howes DeRx is a low-cost, easy-to-build, amateur-band receiver which has been designed with the newcomer in mind. It apparently goes together with the minimum of trouble and is a popular kit. Four versions are available—one for the 10 and 14MHz bands, and others for the 7, 3-5 and 1-8MHz bands. They can pull in dx given a decent antenna, and can run off a 12V dc supply. The kits appear to be an ideal way of getting off the ground with that home-brew construction project at a more than reasonable price. Further details and orders to G4KQH, QTHR.

Here and there

Two first-timers this month. D Smith, BRS42590, has obviously been interested in the hobby for some time. He has had many receivers in his time but wanted to report the fact that his new Philips D2999 is extremely good value. From the photograph enclosed with the letter it would seem that this is a digital general coverage receiver which covers the amateur and broadcast bands from 2-5 to 27MHz. I am advised that among the first stations logged were stations in HZ, JA, VU and ZS. I have no details of the antenna system in use at the swl's QTH.

The second newcomer is Kelvin Day, BRS88184, who is a real newcomer. He had only had a receiver for a very short time and was still finding his way around the spectrum. He was hoping to participate in the HF Challenge.

GW4OXB brought us up to date with the activities of the International Listeners' Association—BRS88763. The group now has 100 members, thanks to mentions in this and other amateur magazines. Although not solely an amateur group, their main aim for October was to support the JOTA weekend on 18 and 19 October. A special award was available to swls for 50p who submitted lists of stations active during the event. No set number, but the best entries received specially engraved trophies. If any swls made a specific effort to log special event stations active on behalf of the Scouts during that weekend, claims should go to GW4OXB, QTHR. The award fee will be donated to "Children in Need".

BRS41542 tripole

In my May 1984 column I mentioned the horizontal tripole designed by BRS41542. He has now designed a "Tripole Sloper—Mk 2" which covers 1-8 to 30MHz. Although primarily designed as an swl antenna for 1-8 and 3-5MHz, it is apparently effective at higher frequencies and gives improved polar diagram patterns over conventional half-wave dipoles and dramatically improves signal-to-noise ratios. If any swl—or licensed amateur—wishes further information BRS41542 has produced an information sheet which can be obtained by sending a sac to P L C Riley, 20 Arling Road, Hale, Altrincham, Cheshire WA15 0LY.

VHF corner

1986 has certainly been a poor year for vhf dx. At the time of writing there has so far this year been no worthwhile tropospheric openings, about 15min of sporadic-E (if you were lucky!), one aurora, and a fairly mediocre Perseids meteor shower. We can only hope that there was some good anti-cyclonic weather in late September and October which helped to compensate.

Meanwhile, in the shack of Martin Parry, BRS52543, extensive tests had been in progress on his new 144MHz converter. The old one only had a gain of 10dB, this one has a gain of 22dB. Martin was certainly impressed with the way in which YU1LA came through on Es, and it was his best dx ever on the band. He would have liked to have used a BF981 in the front-end of the converter with a high-level balanced mixer and 116MHz oscillator with appropriate bandpass filters. He is of the opinion that Mitek would do brisk business if they marketed a 144MHz converter similar to the receiver side of their transverter (perhaps if anyone from that concern reads this, they can tell us why they do not). His preamp, using the 3SK97, also works well, and it only cost him £10 to build.

*9J Elfbank Road, Etilham, London SE9 1QJ.

1986 HF COUNTRIES TABLE (Updates only)

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS31879	200	48	118	174	144	105	56	645
BRS8841	240	48	133	121	147	149	46	644
BRS87156	185	34	98	156	88	109	29	514
BRS32525	177	52	46	120	116	116	55	505
BRS50134	182	44	73	114	101	111	61	504
BRS1066	152	29	81	122	108	72	62	474
BRS31976	155	37	70	111	60	90	51	419
BRS52543	131	34	73	89	93	84	43	416
BRS20249	122	15	40	106	54	54	13	282
BRS44984	109	11	24	78	45	63	0	221
BRS8639	115	26	29	102	22	28	0	207
F11ATZ	107	38	68	16	16	26	9	173

I mentioned the Perseids meteor shower very briefly last month, but with no further reports I will simply say that the event was fairly ordinary until its peak, late on 12 August. Then, good bursts were heard from FIBLL, 14XCC, YUIEV, FIFEN, YU2BHT, YU2KK, OESHWQ, OESMKM, YU1LA, HKTC, OZ1EKI, F8OP, GB2YS, EA6FB, F6DRO, GM4VXX, DK1PZ and HG2NP/0 between 2145 and 0045. Now comes the working out of the locators and trying to get the QSLs!

On the tropo scene, I can relate just two instances of interest. On 4 September HB9AEN/P was heard on both 144 and 432MHz, while on 5 September, OK1KQJ/P (JN69) and FC1DUZ/P (JN86) were good signals.

During the IARU Region I contest on 6/7 September, conditions started off well enough with HB9s heard in the south, but conditions soon deteriorated—at least at those QTHs which did not have the benefit of 200m hills and large Yagi arrays—and the Sunday was quite a struggle. In the north, both Dave Whitaker and Martin Parry were bemoaning the "south of England effect". They heard few of the French portables active, none of the HB9s, none of the DLs and only a handful of the well-sited ONs and PA0s. Roll on 1987 they say!

Late news

Just as the late copy deadline approached, the hf/vhf bands saw the best conditions of the year: 144MHz witnessed sporadic-E, aurora and good tropo conditions in the space of 24h, while 432MHz was full of dx from southern France and HB9. On 19 September there were good tropo conditions to western Germany from southeast England early in the evening, but later the sky lengthened and stations in OK were heard, including OK1KEI/P (JO70) who was located 1,600m asl.

Quite unbelievably, there was a lengthy sporadic-E opening the next morning. I cannot recall such a late E opening, but it is interesting to note that we had a very early opening—in May, not so much to speak of during the "proper" E season, and now this exceptional event. Surprisingly, Martin Parry, Dave Whitaker and I caught some of the opening: Martin (IO83) heard six YUs and one HG between 0836 and 0901; between the same times Dave (IO93) logged YU4DN, YU4DX (JN93), YU8IYR (KN04), YU2ON, YU1LA (KE13F) and YU1ZF. In London I also logged my first YU at 0836, but I understand from G4MVR that the event had been in full swing for some time before that. Loggings in JO01 included YU7GMIN (KN05), YU2SOM, YU1DG (KN04), YU2KDE (JN95), YU1AL (KN04), YU2OB, HG7ZI (JN97) and (for a new country) YO2IS (KF). The last logging was at 0907, and shortly after that DK1KS/P (JN57) was logged; he was only running 2W. Tropo conditions were good during late afternoon and evening but nothing exotic was heard from my QTH or Dave's. Martin complained that he had no tropo conditions at all. The Sunday morning produced some very good dx on 432MHz: HB9MIN/P (JN37), FIAXP/P (JN03), F6ECI (JN05), FIADT/P (JN15), FIEAN (JN06) and F1BUU (ZE18c) all provided me with new squares for the band. There was an assortment of HB9s throughout the day on 144MHz in JN36, 37 and 47, and Joan, BRS62088, logged HB9RSO/P (JN36), HB9RCJ/P, NL/DK4TJ/P and PE1LHP (JO21). Next morning she logged FIADT/P on 144MHz while the om was at work, and on the following day found several F5 in JN18 around lunch-time.

As if this activity was not sufficient, Dave Whitaker mentioned an aurora at 2330 on 20 September. It appears that amateurs in IO93 worked into OY, UA and LA.

Once again it appears that we have to wait until the autumn for the best dx conditions on vhf. Watch this space for further details in due course.

Finale

That's the end of another mixed bag. The vhf table has been held over yet again. Contributions for the January 1987 issue should reach me no later than 15 November with late copy by 24 November. Remember those table scores, and how about some reports of activity on the "new" bands? □

MICROWAVES

Mike Dixon, G3PFR*

Band plans and other microwave concerns

In view of the importance of the topic, most of this month's column is devoted to band planning on our two lowest frequency microwave bands, and particularly the 1.3GHz (or "23cm") band. It is not intended to be alarmist, but serves to illustrate some of the problems which are around and are of major concern to the Society at the moment and to IARU Region 1 societies as a whole.

By way of introduction to this topic, reproduced in Table 1 is the latest version of the UK 1.3GHz bandplan. This was mentioned some time ago as being one of the inputs to the triennial IARU Region 1 conference early next year, where the plan is to be submitted as a model for other Region 1 societies to work upon. The international aspects of the 1,260 to 1,270 and 1,296 to 1,298MHz sub-bands is stressed, for these are used internationally on an almost daily basis, despite being regarded by many as being the domain of a minority of amateurs.

Two things are currently happening which have a bearing on our future use of the bands in their present form. The first is that there is to be a Defence Radio Frequency Spectrum Review, the first part of which covers the range 470MHz to 3.4GHz. This review has been set up following the Meriman Report and the first part is to be completed by the end of this year. The second is the growing problem of interference to amateur activities from a number of sources, particularly radar on 1.3GHz.

A considerable amount of time and effort has been put in by both the Microwave Committee and the Licensing Advisory Committee in submitting definitive amateur usage papers to the review body. The truly international nature of the space and narrowband (weak signal) segments of both 1.3 and 2.3GHz has been heavily stressed, together with the growing interference problems from radar on 1.3GHz and from microwave cookers in the space allocation at 2.4GHz. The fact that microwave beacons and beacon/repeater operate continuously and are professionally monitored has also been pointed out.

Table 1. Current UK 1.3GHz band plan

Sub-band	Usage
1,240-1,256	TV
1,256-1,260	All modes
1,260-1,270 (1)	Space (Earth to space only)
1,270-1,286	TV
1,286-1,291	All modes
1,291-1,291.5	Repeater inputs (20 channels with 25kHz spacing)
1,291.5-1,296	All modes
1,296-1,296.025 (2)	Earth-Moon-Earth
1,296.025-1,296.5	Narrowband modes
1,296.5-1,296.6	Linear transponder input
1,296.6-1,296.7	Linear transponder output
1,296.8-1,296.990 (3)	Bacon exclusive
1,297-1,297.5 (4)	Repeater outputs (20 channels with 25kHz spacing)
1,297.5-1,298	FM simplex (20 channels with 25kHz spacing)
1,298-1,300	All modes
1,300-1,325	TV

Footnotes

- (1) Satellite transponder input frequencies.
- (2) Frequencies between 1,296 and 1,298MHz are used internationally for narrowband, weak signal communication.
- (3) Beacons operate on a continuous basis and are monitored professionally.
- (4) When not relaying signals, repeaters act as beacons and therefore operate continuously.

Appropos the interference problems on 1.3GHz, two letters were received on this subject. The first was from Alan, G3MGU, who is an air traffic engineer. Alan has indicated that some, but not all, of the 1.3GHz radar have been in operation for about the past four years and that the main reason for moving from 600MHz was to clear the bottom end of the tv broadcasting band as was agreed internationally sometime around 1976 and "certainly not to 'see' the weather. In fact a great deal of trouble is taken to ensure that it does not see weather effects at up to 30 nautical miles from the site". Alan pointed out that each radar site has two channels of primary working, one for normal low-density signals (ie, without weather or other "clutter" signals) and which switches automatically to a second, "clutter" channel which reduces such effects by cancellation of clutter by specially generated signals, at the same time informing ATC that weather and other effects are "active" in the indicated area.

The second letter was from Hans, PA0EHG, who is the vhf manager for Veron, the Dutch national amateur radio society. In Holland there is great concern, since the radar is the centre of the country, at

*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LL.

Herwijnen, is on 1,296.77MHz. I quote: "With good conditions the new radar in PA0 was more than 30dB above noise in GM. One or two high power radars can mean an end to all dx working on 1,296". As these radars run about 200MW (yes, mega-watt) eip, they are obviously a serious threat to the international 1,296 to 1,298MHz band which is used for weak signal communications, such as extreme terrestrial dx, up to about 1,500km, beyond which it becomes easier to use the emc path!

Hans continued by saying that the Dutch PTT seemed to be sympathetic to the amateur case and would help if this were possible; the minimum objective being to maintain the international sub-band as free from interference as possible. His comment was that in the UK there was less of a problem since the known radar frequencies did not impinge on this section of the allocation, but warned us to be vigilant. His list of frequencies designated in the UK is given in Table 2.

Table 2. UK radar frequencies

Site	Frequency (MHz)
Heathrow, Tice, Claxby (1)	1,254.23
Pease Pottage (1)	1,260.23
Debden (2), Great Dnn Fell (1)	1,266.23
Heathrow (2), Tice (2), Claxby (1)	1,269.77
Pease Pottage (1)	1,275.77
Debden (2), Great Dnn Fell (1)	1,281.77
TSF	1,314.23
Heathrow (1), Tice, Claxby (2)	1,317.23
Pease Pottage (2)	1,323.23
Debden (1), Great Dnn Fell (2)	1,326.23
TSF	1,329.77
Heathrow (1), Tice (1), Claxby (2)	1,332.77
Pease Pottage (2)	1,338.77
Debden (1), Great Dnn Fell (2)	1,341.77

Frequencies above 1,325MHz, of course, are outside the amateur allocation and should be of no concern to us. By comparing the band plan of Table 1 with this radar list, it can be seen that there is considerable potential for interference both to and from amateur activities, especially in the designated amateur tv sub-bands. Under normal conditions this might not be too significant, but under lift conditions could well prove a major problem to both primary and secondary (ns!) users. There is a further potential interference problem and that is from both primary and secondary users to the much heralded direct satellite tv broadcasting, for the domestic consumer industry have chosen—in our view unwisely—a first intermediate frequency which embraces both the amateur and radar frequencies.

Plenty of food for thought here—rest assured that the Society and its committees are well aware of the problems and are trying to handle them in a rational and logical manner. It should not be forgotten, though, that our status is secondary, although we believe that the importance of amateur experimentation and research is clearly recognized by most authorities. Only time and the currently increasing amateur involvement in microwaves will serve to bring home these important aspects to public notice.

With regard to the 2.3GHz band, there are few problems here at the moment other than the existence of some "non-common" allocations within neighbouring administrations, and some level of interference to the space band (2,400 to 2,450MHz) caused by low-level leakage from microwave cookers. This band is very much the subject of state-of-the-art experimentation and, as equipment and techniques develop, the terrestrial ranges achieved are rapidly approaching those on 1.3GHz. EME is entirely feasible with comparatively modest equipment, so that the future development of this band is expected to closely parallel that of 1.3GHz. We need more 2.3GHz beacons and beacon/repeater proposals in order to help push this development forward; it has already been given some impetus by being included in the VHF NFD "repertoire".

The current UK band plan is given in Table 3.

Table 3. Current UK 2.3GHz band plan

Sub-band (MHz)	Usage
2,310-2,320 (1)	All modes
2,320-2,322 (2)	Repeater linking
2,322-2,400 (3)	Narrowband modes
2,400-2,450 (4)	All modes
	Repeater
	Space (Space to Earth only)

Footnotes:

- (1) Neighbouring administrations have additional amateur allocations in the range 2,304 to 2,310MHz.
- (2) This sub-band is used internationally and it is proposed to adopt a similar plan of frequency usage to that in the 1,296-1,298MHz range.
- (3) Proposed UK repeater standards to use 16MHz input/output spacing. When not relaying signals, the repeater will act as a beacon.
- (4) 2.4GHz beacons are already flying aboard the Uosat experiments.

Operating news

Jack, G5UM (microwave awards manager) sent in a comparatively short report this month with all the claims for 1.3GHz operation. Bill, (Aberdeen), G6MGS, operating portable made a claim for the Five Squares award (No 65) followed, a month later, by the Ten Squares award. It was reported that Bill worked several Continental stations in the good

conditions which prevailed in June and he hopes to be operational in the IARU contest (which will be over by the time this piece is read) in October, using 100W from his portable site.

Martin, G3ZQU (East Anglia), has just gained his 30 Squares award (No 15) and has remarked, as others have done in the past, on the slow rate of return QSLs, despite operating from a "rare" square. His original Five Square award was gained in 1983 and it has taken him over three years to reach 30 confirmed. His total worked to date but not yet confirmed is 38. Top of the list is still G4KIY (Peterborough) at 70 squares confirmed.

The Southwest Hertfordshire UHF Group's 433MHz repeater, GB3HR, has just celebrated its tenth anniversary. What has that got to do with microwaves? Actually, quite a lot because the group also operates the 10GHz beacon GB3SWH which transmits in both wide and narrowband modes. Its second microwave project which should be operational before the end of the year is the 1.3GHz repeater/beacon GB3BH. This will be 1,291.0MHz in and 1,297.0 out (RMO). The group secretary, Trevor, G4KUJ, will always be pleased to receive donations to aid the various projects, especially delighted to receive reports on reception and coverage and has indicated that the group would like to hear from anyone with ideas "for new ventures or additions to our existing stations". If you are interested in having additional vhf/uhf or microwave facilities in this area, then please let Trevor (QTHR) have your ideas. The technical assistance of Giles, G4YGO, Mervyn, G6QJB and Ian, G4NAZ, in pushing along the 1.3GHz project was acknowledged in the report. Acknowledgement of Les (G3BNL) efforts in providing the 10GHz beacon transmitter was made, as was the provision of a good site through the co-operation of the church authorities in the diocese of St Albans. A blessing from on high!

A detailed report of the proceedings of the last Winchester round table has been held over until next month. Meanwhile there will be some coverage of it provided in the *Microwave Newsletter*.

SATELLITES

Bob Philips, G4IQQ*

Fuji Oscar 12

Commissioning of the satellite continued throughout September and was expected to continue well into October, this providing rather irregular periods of access at these times. So far all indications are very good and the full satellite should soon be released to a large audience of waiting amateurs. In order to get going on the satellite some basic information is required.

Firstly the frequency plan for the mode JA transponder. This uses a simple linear frequency shift between up-link and down-link over the 100kHz pass-band. However to minimize the effects of doppler shift the pass-band is inverted by mixing the received signal at 145MHz with a local oscillator at 581MHz to produce the down-link at 435MHz. In this way the effective doppler shift on a signal passing through the transponder is reduced by a factor of two. Even so, the rate of change of received frequency is very much greater than that experienced with Oscar 10. The amount of doppler on a particular signal depends on the position of the ground station with respect to the satellite. The amount of shift due to the down-link path will be the same for all signals arriving at one location, but due to the different up-link components, it is quite possible for two signals to gradually come together without any changes to either up-link frequencies. To avoid these problems the procedure adopted for the Oscar 8 Mode J transponder has been recommended, ie once a frequency for a QSO has been established the receiver tuning should not be changed, any compensation required due to doppler should be made at the transmitter.

The transponder frequency plan is shown in Fig 1. The up-link frequencies are in the range 145.9 to 146MHz and those received from the satellite are from 435.8 to 435.9MHz but as noted above an up-link at 145.9MHz produces a down-link at 435.9MHz. Also to obtain upper side band on the down-link it is necessary to transmit lower side band to the satellite. There is a telemetry beacon at 435.795MHz and this suffers the full effects of the down-link doppler shift which gives rise to offsets of up to ± 13 kHz from the nominal frequency.

Most amateur satellites to date have used either linear or right hand circular polarization. Not so Fuji. The 145MHz up-link antenna is linearly

*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.

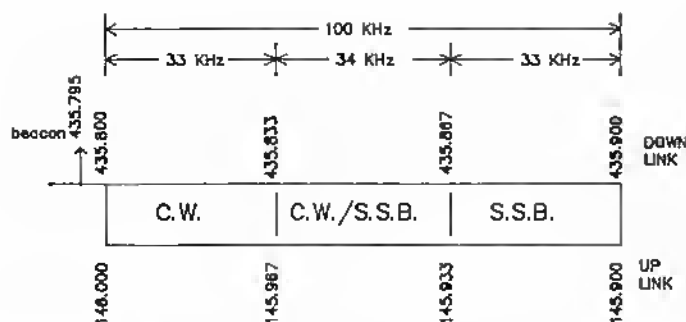


Figure 1 Frequency Plan for FUJI Mode JA Transponder

polarized but the 435MHz antenna for the mode JA transponder uses left hand circular polarization. So if your first attempts to receive the satellite have been somewhat disappointing this is probably the reason why. If your receiving antenna is a helix then it is not possible to change the sense of polarization, but for a crossed Yagi configuration this is a fairly straightforward matter. The only problem is that the antenna will then not be suitable for operation to Oscar 10 which uses rhcp. An alternative is to run a separate feeder to each of the crossed antennas and insert appropriate delay lines into one of the feeders. This technique is described in detail in the antenna chapter of the *VHF/UHF Handbook*, pp826/827. SMC have recently introduced a commercial device which claims to provide continuous control over the sense of polarization from right hand to left hand circular as well as horizontal and vertical linear. I would be interested to hear from anyone who has used these units for satellite operation. For satellite passes where the elevation angle is greater than around 30° it should be possible to obtain adequate gain from crossed dipole antennas, rhcp for 435MHz and either rhcp or lhcp for the 145MHz antenna. Circular polarization is recommended for the up-link as it avoids the need to track the angle of the linear polarization.

So much for the analogue transponder, which is likely to be the most heavily used at the outset. Operation via the digital transponder represents a completely new mode of operation for satellite users. Rather than a broadband channel, as is the case for the JA transponder, the digital system operates with four designated up-link channels and a single down-link channel. The frequencies for the up-link channels are as follows:

Channel #1 145.850MHz Channel #3 145.890MHz
Channel #2 145.870MHz Channel #4 145.910MHz

These are the frequencies required at the input to each channel so it will be necessary to make the appropriate frequency corrections to the transmitted signal. All digital transmissions from the satellite are made on a single down-link frequency of 435.910MHz (before doppler). Transmissions to and from the satellite will use the AX.25 protocols which is the standard amateur packet radio. I included a schematic diagram for a suitable interface to an AX.25 terminal node controller in *Satellites* July 1986. James Miller, G3RUH, has designed his own interface unit and once the design has been tested live through the satellite, printed circuit boards will be made available through Amstat-UK. To complicate the matter of down-link antennas even further, the mode JD transponder has its own transmit antenna which uses rhcp.

A final word this month concerning operating practice which applies equally to both the mode JA and JD transponders. The combination of short access periods, rapid antenna tracking and continuous correction for doppler shift requires a different approach to that for operation through Oscar 10. The most important element is planning. Having decided which orbit you wish to use, draw up a schedule to cover all actions required during the orbit because once the satellite is in sight there will not be any spare time. An example of a typical schedule which might be used is given below:

Fuji Oscar 12		Orbit No 345			
EQX 1730gm1		@ 42° West			
	Time (gm1)	Bearing (deg N)	Elevation (deg)	Doppler (kHz)	
Acquisition of signal					
AOS	1736.5	225	0	+ 10	
	1740	220	10	+ 9	
	1745	210	30	+ 5	
	1749	180	50	+ 2	
TCA	1751	150	60	0	
	1753	105	50	- 2	
	1755	90	30	- 5	
	1800	70	10	- 9	
Loss of signal	1803	70	0	- 10	

Oscar 10

After several attempts to re-write the software for the Integrated Housekeeping Unit, it has not yet been possible to bring the satellite back into regular operation. The satellite was entering a period of poor sun angles at the end of September and this was likely to further exacerbate the problems. One option being considered was to go for a 'total power down' of the satellite. It is possible that under these conditions there may be some self repairing of the faulty memory cells, however there is also the danger that the depth of discharge of the batteries may become too great to allow subsequent recovery. The message to users is **don't**, since any large signals appearing in the pass-band of the satellite will increase the load on the satellite's power system, particularly if it has not been possible to command the transponder off. Work is continuing in a number of centres around the world and every effort will be given to squeeze some more life from the satellite at least until its successor is in sight.

In view of the fact that the satellite is unlikely to be available this month and also to leave more room for other items, I have not included the usual availability chart.

RS satellites

After nearly five years of successful operation, both RS5 and RS7 are still in good working order. Both satellites entered an eclipse season during September which continues until the beginning of December. During the period of the longest eclipses (end October/beginning November) each satellite spends up to 35min out of the period of 120min in the shadow of the earth. As a consequence it is necessary to reduce the loading on the power system by means of a restricted operating schedule:

RS5	Transponder	ON	0500 to 0900gmt
	Robot	ON	As battery condition permits
RS7	Transponder	ON	0900 to 1300gmt

There is no further news concerning the launch of RS9 and RS10. The earliest date is now likely to be end January 1987.

Uosat

I have mentioned in previous issues that the University of Surrey have been collecting views from users as to what type of operations schedule they would like to see. The development of long term Diary software for both satellites has opened up the possibility for considerable flexibility in terms of on board activities while minimizing the load on the command station. As a result of this consultation, new schedules have been drawn up for both satellites. Uosat Oscar 9 will operate with a monthly programme and the planned activities for the month will be indicated within the bulletin part of the transmissions. The schedule is as follows:

Friday to Wednesday—whole orbit data
telemetry
monthly schedule
OBC status messages

Saturday, Sunday, Monday WOD includes radiation experiment

Wednesday also CCD transmission

Thursday—transmissions switched off to allow CCD image to be taken and necessary up-link messages.

Note: the hf beacons will be activated every day if adequate power is available.

By contrast Uosat Oscar 11 will operate on a weekly schedule and will in future contain a number of new features to the satellite. The planned schedule is as follows:

Friday to Wednesday—whole orbit data
telemetry
OBC status messages
bulletin

Wednesday also DigitaLink and both 145 and 435MHz beacons active;

Saturday also 2GHz beacon

Thursday load bulletin during the morning (gmt) then diary.

When these changes are fully implemented it should be possible to operate both satellites to much more reliable schedules which will be very useful to the large number of users covering a very wide range of interests.

Other news

The launch manifest for Ariane has now been published and indicates that the next planned launch is the V19 (Ariane 3) which is scheduled for February 1987. The Phase 3C satellite is due to be launched on the first flight of the new Ariane 4, due for June 1987. This information assumes that the modifications to the third-stage engine can be carried out within the planned time and are of course successful. □

DATA COMMS

Ian Wade, G3NRW*

Packet repeater licensing

Martin Stubbs, G8IMB the data repeater co-ordinator on the RSGB Repeater Management Group, reports that 14 applications for experimental digital repeaters (digipeaters) were submitted to the DTI on 13 August, as follows (contact call signs in parentheses): GB3AP-Dudley, West Midlands (G4TEC); GB3BP-Bristol, Avon (G8IMB); GB3DB-Honiton, Devon (G1DII); GB3DP-Weymouth, Dorset (G3VPF); GB3CD-Crewe, Cheshire (G4BVE); GB3EP-Exeter, Devon (G4WJZ); GB3HP-Winchester, Hants (G4ZRT); GB3HQ-Peters Bar, Herts (G3OUF); GB3JP-Si Helier, Jersey (GJ6ENP); GB3KP-Kingsdon upon Thames, Surrey (G8LWY); GB3NP-Norwich, Norfolk (G8QR); GB3UP-Guildford, Surrey (G3YJO); GB3XP-New Malden, Surrey (G8GGI); and GB3YP-Harrogate, North Yorks (G4SHJ). All these repeaters will operate initially on 144.650MHz, with an option to use 145.275MHz instead, for rounding experiments and to minimize possible mutual interference problems. This is very good news, and we all look forward to getting the go-ahead for the big switch on, hopefully by the end of the year.

Packet news

AMRAC seems to be getting bigger and busier! Phil Bridges, G6DLJ, is their indefatigable secretary and PR man (see last month's column for his new address), and he mailboxes me on Prestel almost every other day with hot news from the group. A selection: two WOLLI packet bulletin boards are in operation, at G6KQZ in Basingstoke and at G4ZRT near Winchester; their digipeater GB3HP is fully tested and ready to go when the licence comes through; they plan to hold a national convention in the spring, somewhere in the middle of the country; there is now an Essex branch of the group, based in Brentwood (contact Dave Hill, G4ODK, on 0268 418058 or Prestel 268418058 for details); nearly all their members use vertical polarization on 144MHz; they had an excellent talk recently on packet satellites by Jeff Ward, K8KA; and they have a copy of the WA4GPF AX.25 driver program for the Atari 520ST.

Other packet news: John Clifford, G4BVE, in Goostrey, Cheshire, reports a packet pocket in the northwest, with around a dozen stations on AX.25, G4YTT and G8WWF have both operated genuine /M (as passengers, of course!), and Manchester Raynet have shown interest in using packet for emergencies. Most stations in the area use the Pac-Comm TNC200 inc. . . Doug Douglas, G4SHJ, and G1OQQ are active in North Yorkshire, and there are several Ws in Ripon ready to go on packet once they receive their reciprocal licences. . . Gerry Lawlor, EI9FV, reports that a group in the Dublin area is getting going on packet, and will be pleased to hear from anyone wanting to join in. . . Alan Dunford, G3XOF, in Derby, says that several stations are now using the G0BSX inc, and would like to hear from anyone writing a BBC terminal emulator for it. . . Ray Taylor, G6TNZ, is active most evenings on packet from Lincoln, but restricted to 10W—when he runs 90W “... ‘ci indoors says the telly is on the blink with a raspy noise every so often!”. Ray also reports two stations active in Scunthorpe, and more to follow soon in Lincoln. . . Grosvenor Software, at 2 Beacon Close, Seaford, East Sussex BN25 2JZ (tel 0323 893378) announce their new packet system running on a Dragon 32 or 64, or Tandy Color computer. It is a full implementation of AX.25 Level 2 Version 2, and supports up to six simultaneous connections. The software in a rom cartridge plus an assembled 1,200bps modem costs £99.

Tone standards

There are nowadays so many different tone standards in use on the amateur bands, and on telephone data systems such as Prestel, that a brief review of them may be useful to put them into perspective—See Table 1.

RTTY and Amtor tones. There are two standards in common use for rtty and Amtor transmission, often known as “low tones” and “high tones”. The low tones standard is mostly used in the UK and Western Europe, whereby the space frequency is always 1,275Hz, and the mark frequency can be 1,445Hz (for 170Hz shift), or 1,700Hz (for 425Hz shift) or 2,125Hz (for 850Hz shift). By far the most common mark frequency is 1,445Hz,

Table 1. Amateur and commercial tone standards (all frequencies in hertz)

Tone standard	Shift	Mark	Space	Tone standard	Shift	Mark	Space
RTTY/Amtor (Low tones)	170	1,445	1,275	V21 300/300	orig	200	980
	425	1,700	1,275		answer	200	1,650
	850	2,125	1,275	V23 Mode 1	fwd	400	1,300
RTTY/Amtor (High tones)	170	2,125	2,295		rev	60	390
	425	2,125	2,550	V23 Mode 2	fwd	800	1,300
	850	2,125	2,975	(Prestel)	rev	60	390
Cassette (BBC)	1,200	2,400	1,200	Bell 103	orig	200	1,270
Most AX.25	200	1,600	1,600		answer	200	2,225
Incs	1,000	1,200	2,200	Bell 202	fwd	1,000	1,200
Kantronics	200	1,270	1,070		rev	—	387
AX.25 Inc	1,000	1,200	2,200				

suitable for 45.45/50bps Bandot rtty and 100bps Amtor signals, and also usable for Ascii rtty at 110bps. Above this speed, the 425Hz and 850Hz shifts could be used, but these are unusual in amateur transmissions. Note that the mark frequency is always *higher* than the space.

Much of the rest of the world uses the high tones standard for rtty and Amtor. Here, the mark frequency is 2,125Hz, and the space frequency can be 2,295/2,550/2,975Hz, for 170/425/850Hz shift respectively. Note that with these tones the mark is always *lower* in frequency than the space.

With both of these standards, the mark frequency represents a data “1”, and the space frequency represents a “0” or an rtty start bit. When using an fm radio, all that is necessary is to ensure that the transmit and receive polarity switches on the tu (terminal unit) are set to “normal”, and everything should work properly. With ssb, however, the situation is a little more involved. Here, the usual convention is that the higher of the two radiated frequencies represents a data “1”. This means that you have to think about which sideband to use; choosing the wrong sideband will mean that your signal is inverted. The rule is very simple: for normal polarity low tones, you always use upper sideband, and for normal polarity high tones you always use lower sideband. If you switch the tu to “inverted” tone polarity, the opposite applies. So far so good, but what complicates matters is that your radio probably switches sidebands automatically, depending on whether you are above or below 10MHz—above 10MHz you normally get upper sideband, and below 10MHz you normally get lower sideband. This means that for operation on certain bands you will need to invert the tones (either by setting the tu polarity switches to “inverted”, or by selecting reverse sideband on the radio) to make sure that the tones are the right way up—see Table 2. Thus, for example, if you use normal polarity low tones, you will need to select reverse sideband on 1.8, 3.5 or 7MHz, and normal sideband for all the other bands.

Table 2. Choosing the correct tone polarity and sideband for rtty and Amtor, to ensure that the higher of the two radiated frequencies always represents a data “1”. Where indicated with an asterisk it will be necessary to use reverse sideband.

Tones	TU polarity	Mark	Space	1.8, 3.5, 7MHz	All other bands
Low	Normal	1,445	1,275	USB*	USB
Low	Inverted	1,275	1,445	LSB	LSB*
High	Normal	2,125	2,295	LSB	LSB*
High	Inverted	2,295	2,125	USB*	USB

Cassette tones. One of the most common cassette tape standards uses 2,400Hz for mark (“1”) and 1,200Hz for space (“0”). The BBC computer uses it, and data can be transferred at 1200bps and higher, provided that the tones are undistorted—a problem to watch out for is overdriving the radio, when the 1,200Hz sinewave can become so flattened that it contains a strong second harmonic component at 2,400Hz, making it look like a mark instead of a space. Uosat 2/Oscar 11 uses these tones, but the earlier Uosat 1/Oscar 9 uses them the other way up.

AX.25 packet radio tones. Most incs use two pairs of tones—a narrow-shift (200Hz) pair for 300bps working on the hf bands, and a wide-shift (1,000 Hz) pair for 1,200 bps traffic on vhf. The most common narrow-shift tones are 1,600/1,800Hz, an exception being the Kantronics Packet Communicator, which uses the Bell 103 originate tones of 1,270/1,070Hz—the fact that the Kantronics unit is different does not matter, of course, because when using packet with an ssb radio we are only concerned about the shift, not the actual tone frequencies. On vhf, the wide-shift tones are always 1,200/2,200Hz (the Bell 202 standard).

Hands up all those who remember what mark and space represent in AX.25 packet. Mark equals “1” and space equals “0”? Wrong! The other way up? Wrong again! Back to school (or the August *Data Comms* column, p585) for a reminder that AX.25 uses NRZI, in which a *change* from one tone to the other represents a “0”, and *no change* means a “1”. The beauty of this is that it does not matter which way up the tones are sent (and on hf it does not matter which sideband we use), because the receiving end only detects *changes* in tone, not the actual tones themselves. □

*7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF. Prestel mailbox 219999743.

Contest News

3.5MHz Hopscotch Contest 1986 results

After the successful inauguration of the Hopscotch Contest last year and the strongly supportive comments received from all entrants, the 1986 event was assured of sufficient support and this new contest has now become a regular feature in the annual calendar. The level of activity and of logs submitted was very similar to that in 1985, which is encouraging bearing in mind the atrocious band conditions that prevailed: static levels were horrendous over much of the country, and many stations in the south lost operating time when electrical storms passed overhead.

The rules were closely adhered to by all entrants and seem to work well. As support grows and the band becomes busier the rationale for the QSY rule will grow in importance and dashing up and down the band will become all the more exciting! Meantime, contests in their infancy are certainly ideal training grounds for the less-experienced contestants.

In adjudication, log accuracy was seen to be very high—beyond the occasional copying/recording errors in callsign etc.—the most common source of error was incorrect county codes. It might be suggested that entrants next year (and also in the RSGB 1.8MHz contest) arrange to have a copy of the RSGB county code list on the desk to check the existence of a copied code while the QSO is in progress. That list appears in each January's *Radio Communication*.

Congratulations to the winner, G5LP, and the runner-up, G3NOM—see you next year!

Posn	Callsign	Points	Posn	Callsign	Points
1	G5LP	750	19	G4BUO	410
2	G3NOM	710	20	G3IGU	397
3	G4WQN	640	21	G4EBK	370
4	G3KAF	630	22	G3EZZ	337
5	G3SXW	580	23	G3BPM	320
6	G4QGB	570	24	G4SLE	317
7	G3JG	540	25	G3LHJ	310
8	G3UKV	537	26	G3KZJ	300
9	G4ARI	530	27	G3MCX	290
10	G4BOU	520	28	G4NFX	250
11	G4JZN	514	29	G3NKS	230
12	G3HLU	490	30	G3WYV	230
13	G4WALG	470	31	G4HZV	217
14	G4ODV	450	32	G0DYX	201
15	G4ELZ	441	33	GM3UM	180
16	G4PKU	440	34	GMWRKVJ	136
17	G4SFO	437	35	GM0BZF	127
18	GW4HDB	420			

A checklog from G8GF is acknowledged with thanks.

Affiliated Societies Team Contest 1987 rules

1. **General.** No changes are being made to the rules of AFS, one of the most popular contests on the RSGB's hi calendar. However, in order to encourage newer cw operators to take the plunge and participate, it is recommended that (on an experimental basis) a small part of the band—3,575 to 3,590kHz—be identified as a "QRS corral" where not only slower operators will find other QRS stations, but also where QRQ entrants (if they send a bit slower) can have QSOs which they might not otherwise make. This is not intended to detract from the QRQ rough and tumble of the rest of the band during AFS, but is to encourage more members, who might be shied off by the QRQ cw, to take part. If every club which took part last year can convince just one more member to take the plunge, make a few QSOs and put in a log, we'll make 500 entries in 1987.

2. **When.** 1300 to 1700gmt, Sunday 11 January 1987.

3. **Teams.** AFS is a competition between teams of stations, each team or teams representing an RSGB affiliated society. Each such society is encouraged to enter as many stations and teams as it can.

(a) A society entering one team will have its placing determined by the aggregate scores of the five highest scoring stations in its team.

(b) A society may enter more than one team. The aggregate score of the five highest scoring stations are placed in team "A", the next highest scoring stations placed in team "B" etc. Club secretaries are required to include a "team summary" which shows the calls, individual claimed scores and team claimed scores of their society's entry. Please note 8(b)(i).

4. Eligible entrants.

(a) Each operator must be a member of the society he represents, but need not be a member of the RSGB.

(b) Each station may be single- or multi-operator, but no operator may use more than one callsign during the contest period.

(c) All stations representing a society must be operated within 50 miles of the normal society meeting place.

(d) No station may represent more than one society.

(e) In the case of a society with national coverage, eg RNARS, each team may define a different society meeting place, but this should be a place of recognizable significance, eg a naval base. For all purposes, other than the indication of affiliation, each such team entry will be considered to be entirely separate.

5. **Contacts.** CW (A1A), only in the band 3,510 to 3,590kHz, with the recommendation that 3,575 to 3,590kHz be reserved for slower speed QSOs.

6. **Exchange.** RST and serial number commencing 001.

7. **Scoring.** Ten points per contact. Entrants are reminded that unmarked duplicate contacts for which points have been claimed are subject to a penalty deduction of 10 times the points claimed. Club secretaries are urged to ensure that logs are fully and accurately "duplicated" before being submitted.

8. Entries.

(a) Each individual entry must conform to the general rules for RSGB hi

contests, as published in the "Operating Guide" supplement, *Rad Com* January 1987. In particular each log must be accompanied by an hf contest summary sheet (Form HFC2). All entries from one society are to be sent in one package to RSGB HF Contests Committee, PQ Box 73, Lichfield, Staffs WS13 6UJ. Packages underpaid and bearing postage-due stamps will be returned to the sender. Packages must be postmarked not later than Monday 26 January 1987.

(b) Each package must include:

- The individual logs each with an HFC2 summary sheet.
- A team summary stating the number and composition of teams representing the society as well as the claimed scores of each team. The composition of teams will not be altered following adjudication, even if the composition of the highest-scoring team is no longer optimum.
- A declaration signed by an officer of the society that each entrant is a member of that society. The normal meeting place of the society must also be given.

9. Awards.

- The Edgware Trophy will be awarded to the leading affiliated society.
- A certificate of merit will be awarded to the station having the highest individual score.
- A certificate of merit will be awarded to the leading affiliated society in each RSGB zone.

G3SXW

Ropoco 1 1986 Contest results

This year very few points have been lost through unmarked duplicates compared with 1985. General comments are to leave the rules as they are. Quite a number of entrants commented on some of the "peculiar" post codes, and points have been lost when the recipient has attempted to correct them! Many thanks to those who submitted either a log or check log.

G3HCT

Posn	Callsign	Points	Posn	Callsign	Points
1	G4NU7A	860	38	G4WLG	420
2	G5LP	790		G3JZ	420
3	G3RTE	780		G3QXC	400
4	G3POL	770	40	G3AIO	400
5	G3KAF	750		G4CIB	390
6	G4FAM	740		G4KWI	390
7	G4OBK	730	42	G4SNO	390
	G3NKS	680		G4ZNH	390
8	G3SXW	880	46	G3SB	370
	G4BUO	680	47	G3AWR	360
11	G3KKQ	870		G4WYG	340
12	GW3WVG	860	48	G4HZF	340
	G4DJX	640		G3BPM	340
13	G3SYA	640		G0CUE	340
15	G4BOU	500		G4SZI	330
16	G2VJ	580	52	G4ZPG	330
	G3LRS	580		G3COR	320
	G3RCG	530	54	G3OLB	320
18	G3QGB	530		GM4OSS	310
	G3LHJ	530	56	G3GMM	310
21	G4OTV	520		G4PUR	310
22	G4ELZ	510		G4XOK	300
	G4ARI	500	59	G3RYP	300
23	G3MA	500	81	G4WZV	280
	GW3JL	490		G3OOT	270
25	G4ODV	490	82	GM3UM	270
	G6BM	490	84	G4SHB	260
	G4EBK	470	85	G4KLO	250
28	G3LP	470	86	G4QOS	230
	G4UMS	470	87	G4WYN	200
	G3MUQ	470		G4XUV	190
32	GW4ALG	460	88	G4ZME	190
	G3MCK	460	70	GM4OBD	180
34	G3HLU	450	71	G3JSK	160
	G4OYC	440	72	G0BLO	120
35	G4PKU	440	73	GM4LVW	70
37	G0CLP	430	74	G4PVB	30

Check logs: GW4SHR, G3EAD, G48PE, G3WYK, G3JKS.

Dartford Heath DF Qualifying Event results

The sunshine plus the improved access to the Garden of Kent resulted in a record number of entries for this event; 25 per cent up on last year. Eighteen teams assembled at the start on Dartford Heath under the watchful eye of the starter, G3YIV. Identifiable signals were heard at the start from both transmitters, and competitors commenced to depart from the start from 1.26pm onwards.

Station A, operated by G4CDM, was located in Joydens Wood, only two miles south of the start, in dense undergrowth provided by some flowering bushes.

Station B was located to the east of the heath, almost at the edge of the map and operated by G8DYF and G4GMN. It was concealed beneath large trees and shrubs. Judging by the number of thorns that both operators removed later, the hide was also very prickly. After the last team had found its way in, there was no evidence that the hide ever existed; the undergrowth had been completely flattened.

Tea was provided at Stone village hall, and thanks are due to Lynn, Margaret and Rosie for helping with refreshments. The Dartford Heath DF Club thanks all who attended, and especially those who travelled great distances to support our event.

		Time of arrival	
Posn	Name	Club	Stn A
1	A Simmons	Mid-Thames	1509
2	T Gage	Mid-Thames	1511
3	P Lisle	Mid-Thames	1513
4	G Plummer	Mid-Thames	1513
5	C Wells	S Manchester	1522
6	P Clarke	Chelmsford	1514
7	G Whenham	Coventry	1443
8	B Bristolow	Mid-Thames	1602
9	I Deacon	Dartford Heath	1514
10	F Mephram	Mid-Thames	1523
11	D Yorke	S Manchester	1614
12	A Williams	Mid-Thames	1515
13	G Fester	Stratford	1628
14	R Goodenall	Mid-Thames	1510
15	D Newman	Northampton	1630
16	S Poole	Mid-Thames	1602
17	M Ellis	S Manchester	1512
18	P Woellett	Dartford Heath	-----

A Simmons and T Gage qualify for the National Final

Results of the HF Contents Championship 1985/6

Posn	Callsign	Score	Contests entered	Posn	Callsign	Score	Contests entered
1	G4OBK	5,962	8	28	G4BWP	1,969	3
2	G4BUO	4,639	6	29	G3VYI	1,952	4
3	G2OT	4,550	5	30	G3ZEM	1,901	2
4	G3MXJ	4,454	5	31	G3KSH	1,892	6
5	G4GNY	4,224	2	32	GW3WVG	1,845	2
6	G3FBX	3,919	2	33	G3ESF	1,811	3
7	G3JKS	3,827	4	34	GW3JI	1,708	3
8	G3SWH	3,451	6	35	G2HLU	1,692	3
9	G4AMT	3,414	4	36	G3BPM	1,574	4
10	G5MY	3,379	5	37	G4GIR	1,550	2
11	G3SLJ	3,322	5	38	G3SKW	1,526	3
12	G3YEC	3,300	5	39	G3PDL	1,523	2
13	G3NAS	3,206	2	40	G3TBK	1,484	2
14	G3LZO	2,659	3	41	G3CCZ	1,478	3
15	G4WQN	2,565	3	42	G3SIX	1,402	2
16	G4OTU	2,514	3	43	G3GMM	1,400	6
17	GM3YOR	2,467	4	44	GM4SID	1,380	4
18	G4DJX	2,433	2	45	G4EBK	1,287	3
19	G4QDV	2,344	7	46	G3OLB	1,216	2
20	G4FAM	2,263	3	47	G4KHC	1,161	2
21	G4E0F	2,232	2	48	G4ECI	1,153	3
22	G3KDB	2,188	2	49	G4UZN	1,132	3
23	G3PSM	2,158	2	50	G4ELZ	1,126	2
24	G3TXF	2,145	5	51	G3AWR	1,120	4
25	G3APN	2,089	2	52	G4IUF	1,107	2
26	G3RVM	2,011	2	53	G4WYG	1,070	3
27	GW4UZL	1,984	3	54	G5LP	1,055	2

Contests Calendar

1 Jan-31 Dec	UBA SWL (Rules in December SWL News)
1, 2 November	144MHz CW (Rules in August issue)
3, 11, 19, 27 Nov,	28MHz Phone Cumulatives (Rules in September issue)
5 Dec	
8 November	Australia Ladies ARA (Rules in October HF)
8 November	432MHz Cumulative (Rules in August issue)
8, 9 November	European DX (II) (Rules in August HF)
8, 9 November	Second 1.8MHz (Rules in October issue)
9 November	OK DX (Rules in November HF)
15, 16 November	All Austria (Rules in November HF)
16 November	1,296/2,320MHz Cumulative (Rules in August issue)
24 November	432MHz Cumulative (Rules in August issue)
29 November	CO WW DX CW (Rules in October HF)
2 December	1,296/2,320MHz Cumulative (Rules in August issue)
7 December	144MHz Fixed and AFS (Rules in October issue)
10 December	432MHz Cumulative (Rules in August issue)
14 December	70MHz CW (Rules in October issue)
18 December	1,296/2,320MHz Cumulative (Rules in August issue)
1987	
11 January	Alliliated Societies Team (Rules in November issue)
18 January	White Rose ARS SWL LF Bands (Details from G3ZGA)
7, 8 February	7MHz (Rules in October issue)
21-23 March	BARTG Spring RTTY (Details from G6LZB)

Posn	Callsign	Score	Contests entered	Posn	Callsign	Score	Contests entered
55	G2MJ	1,016	2	66	G4KKG	766	2
56	GW3MPB	1,011	2	67	G4HZF	710	2
57	G3OLU	982	4	68	G4WEY	705	2
58	G3ILO	979	7	69	GM3UM	655	2
59	G4GB	937	2	70	G3DOT	650	2
60	G3MCX	888	2	71	G4RX	623	2
61	G3VCL	839	2	72	G8OZ	441	2
62	G3RXP	807	2	73	G3UHU	363	2
63	G4MET	791	2	74	G3JUY	309	2
64	GM3VEY	782	2	75	G3AEZ	275	2
65	G3RZ	766	3	76	GW4KVJ	39	2

1. The G2OT Trophy to P J Catterall, G4OBK.
2. Runner-up certificate to D Lawley, G4BUO.

Club News

The following is the latest information received by RRs from the RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in January 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the January issue should reach them by 15 November and for the February issue by 2 December.

Club programmes are given in order of date, subject, time and place of meeting. All call signs of club secretaries and other contacts are QTHP (correct in the current RSGB Call Book) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

REGION 1—RR B Donn, G3XSN, 7 Thurne Wey, Liverpool L25 4SQ. Tel 051 722 3644.

Chester (C&DARS)—3 Nov (Quiz with Ellesmere Port), 4 (Committee meeting), 11 ("Amateur radio on a shoestring", G3RJV), 18 ("Electrostatics", G4JYQ), 25 (Surplus sale), Morse classes 7.15pm, main meetings 8pm. Chester Rugby Union Club, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.

Crewe (S Cheshire ARS)—10 Nov ("Railway workings", P Johnson), 8 Dec (Annual social), 8pm. LMR Sports Club, Goddard St, Crewe. Details G1PUV, tel 07816 73185.

Fylde (FARS)—4 Nov (Equipment sale), 18 (informal with Morse), 7.45pm. The Kille Club, Blackpool Airport. Sec G8GG, tel 725717.

Leyland (Central Lancs ARC)—3 Nov (Noggin & natter), 5 (Trip to Red Rose Radio), 17 (Microwave Modules), 1 Dec (AFS 144MHz Contest, Planning Christmas junk sale), 8pm. The Priory Club,

Broadfield Drive, Leyland. Morse classes at 7.30pm. Details G4OBK, tel Chorley 74451.

Manchester (SMRC)—7 Nov (Annual dinner), 14 ("Telecommunications in North Africa", G3SVW), 21 (CW night), 28 ("Ham radio USA style", G3ZDM/W1), 8pm. Sale Moor Community Centre, Norris Rd, Sale. Details G2AKR.

Ormskirk (O&DARC)—6 Nov ("Amateur IV", G6AWD), 18 (Visit to Granada TV News studio, Albert Dock), 8pm. 4 Dec (Practical evening, G4LTI), 8pm. The Community Centre, Chapel St, Ormskirk. Sec G1KDF, tel 74868.

Penrith (EVRS)—20 Nov ("Marine radio", G4EXD), 7.30pm. Meetings at The Ulswater Centre, Penrith, or The Crown Hotel, Eamont Bridge. Details G4XPQ, tel Cullinagh 462, or G4XET Kirby Thore 61745.

Stockport (SRS)—12 Nov ("G3FYE", G3LX), 19 (informal), 26 (Construction competition), 10 Dec (AGM), 8pm. The Magnol Inn, Wellington Rd North, Stockport. Sec G4FFW, tel 061-224 7880.

Tarporley (MCARS)—12 Nov (Grand junk sale), 7.30pm. Colebrook Village Hall, Nr Tarporley. Details G8PNL, tel 553508.

Thornhill Cleveleys (TCARS)—3 Nov (Meeting cancelled), 10 (informal), 17 ("Electricity your energy efficient Ireland", Speaker from NORWEB), 24 (informal), 1 Dec (Construction clinic), 7.45pm, 1st Northbreck Scout HQ, Carr Rd, Blispham, Blackpool. Info tel 0253 853554.

Warrington (WARC)—4 Nov ("Unexplained Fibre Optics", Martin Wells from BICC), 11 ("Contest operating", G4JLG), 18 ("Power regulation via op-amps", G6AWD), 25 ("Noise blankers", G8HLZ), 2 Dec (Open forum), 8pm. Tuesdays, Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec G0CBN, tel 0925 814005.

Wigan (W&DARC)—Wednesdays, 7.30pm. St Jude's Club, Poolstock Lane. Sec G0DTY, tel 0942 47416.

Wigan (Douglas Valley)—6 Nov (Annual surplus equipment sale), 8pm. Standish Conservative Club, School Lane, Standish, Nr Wigan. Details G4GWG, tel Wigan 211397.

NARC Inter-club Quiz Competition

During the year, the Northern Amateur Radio Confederation ran its first Inter-Club Quiz Competition for the member clubs, culminating in a very close final between the North Cheshire RC and the Trafford ARC. The venue was the HQ of the Oldham ARS, where some 70 friends and supporters saw Bert Donn, G3XSN, Region 1 representative, present the handsome trophy.

After a ding-dong first round, with honours fairly even, North Cheshire moved into a five point lead at the end of the second round. However, Trafford came back to bring the final to a nail-biting finish, just failing to catch their opponents by a single point; thus giving North Cheshire the trophy by a (Cheshire) cat's whisker.



Waller, G4RMW, receiving the trophy from G3XSN, with Bob, G4ARP, and Steve, G1KJC, questionmaster, in background

Woodford (RATED)—10 Nov ("Packel radio", G4BVE), 24 (Surplus equipment sale), 8.15pm. British Legion Club, Moor Lane, Woodford, Nr Bramhall. Info G4SFU, tel 061-485 3912.

Welcome to the Wigan & DARC which appears for the first time in "Club News". Thank you to Rossendale ARS for their hospitality on my recent visit and for the beautiful flowers for my wife Julie. Also to The Isle of Man amateurs for another warm welcome and their kindness during my visit in September. **RR1**

REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX. Tel 0401 50397.

Hallifax (H&DARS G2UG)—8 Nov (Components sale by Birkells), 7.30pm. The Running Man PH, Pellon Lane. Details G0DLM, tel 0422-202306.

Hull (H&DARS G3AMW)—2 Nov (Sunday Autumn equipment sale). West Park Recreational Centre, Wallon St. Details G0DMP, tel 0482-862149.

Kelghley (KARS RS 84851)—11 Nov (Informal), 25 (Firms). Victoria Hotel. Details from G1IGH, tel 0274-496222.

North Wakefield (NWRG G4NOK)—6 Nov (Talk by G4OOC), 13 (On the air), 20 (Lecture/Visit), 27 (Monthly meeting). Meetings at White Horse ph. Details G4RCH, tel 0532 536633.

Pontefract (P&DARS G3FYQ)—6 Nov ("Amor" G1BLT), 13 (On the air from South Kirkby town council HQ), 20 (RSGB Video), 27 (Informal). Carleton Community Centre. Details G0AAO, tel 0977 43101.

Todmorden (T&DARS G4WYT)—3 Nov (Video Aerial Circus), 17 (Visit by G4EJP RR2), 8pm. Queen Hotel. Details G1GZB, tel 070681 7572.

UK FM Group (Northern G8KFM)—2 Nov (Monthly meeting). Royal Hotel, Barnsley. Details G4UNA.

Wakefield (W&DARS G3WRS)—4 Nov (Talk by G4JKH), 11 (Talk by G3WWF), 18 (Film night), 25 ("Amateur satellites", G4JJ). Community Centre, Prospect Rd, Ossett. Details G4VRY, tel 0532 820198.

Wawne (Wawne Raynel Group G4UWE)—3 Nov (Contest with other Humberside groups), 20 (Group meeting at Humber Bridge), 24 (Training Meeting and Year in review). EP Section Meaux Rd. Details G4EJP, tel 0401 50397.

Wharfedale Repeater Group. New contact, G4OWG, tel 0532 502158.

White Rose (WRARS G3XEP)—5 Nov (Bonfire night), 12 ("Microwaves", G3PYB), 19 (Visit from Birkelle), 26 (Bash the committee with G3PSM). Moorlow RUFC Moss Valley, Kings Lane. Details G4ATZ, tel 0937 842790.

York (YRGA G4YRC)—11 Nov (Informal), 25 (Bring & Buy junk sale). Meetings at Ashcroft Hotel. Details G1FTA, tel 0904 704634.

Will secretaries please update me with fixtures and inform me before the deadlines, particularly for repeat info in Jan. **RR2**

REGION 3—RR G Ross, G8MWR, 81 Ringwood Highway, Coventry CV2 2GT. Tel 0203 816941.

Althorpe (AARG)—10 Nov (AGM) 24 (RSGB ILM). Upper School, Long St, Althorpe. Sec G6YOU, tel Chapel End 393518.

Birmingham (Midland ARS)—18 Nov (Home brew contest), Unit 5, Henslead House, Henslead St (off Bromsgrove St). Sec G8BHE, tel 021-422 9787.

Evesham (ERAG)—6 Nov (Construction evening, G3CUF). Details G4UXC, tel Evesham 831508.

Halesowen (MEBRG)—11 Nov ("Other side of the blackboard", G6RYG), 26 (Open meeting), 8pm. MEB Social Club, Mucklow Hill, Halesowen. Sec G4RWH, tel 021-747 8784.

Oswestry (O & DARC)—4 Nov ("Oscar 10", GW1LX), 18 (Actively night), 8pm. Bell Hotel, Oswestry. Sec GW6YIY.

Shrewsbury (SALOP ARS)—6 Nov ("PAL IV system", G1TFQ), 13 ("Night on the air"), 20 (Bring and buy), 27 (Natter night), 8pm. Old Bucks Head, Frankwell, Shrewsbury. Sec G0EYI, tel 0743 67799.

Solihull (SARS)—20 Nov (Antenna planning applications). The Shirley Centre, Stratford Road, Shirley. Sec G8AYY, tel 021-783 2996.

Stafford (SARS)—4 Nov (Informal meeting), 11 (Night on the air), 8.30pm. Coach and Horses, Pasturefields, Staffs. Sec G6DAT, tel (08894) 2453.

Stratford-upon-Avon (SOA & DRC)—10 Nov (Converting commercial equipment), 24 (Talk by a member of DTI), 7.30pm. Baptist Church, Payton St, Stratford-upon-Avon. Sec G8OVC, tel 750584.

Warwick (Mid WARS)—11 Nov (Junk sale), 25 ("Early radio collecting"), 8pm. St John HO, 61 Embscot Rd, Warwick. Sec G6VHI.

Wolverhampton (WARS)—4 Nov (Slide and film show), 11 (Power transistors), 18 (Committee meeting), 23 (DF hunt), 25 (Night on the air), 8pm. Electrically Sports Club, St Marks Rd, Chapel Ash, Wolverhampton. Sec K Jenkinson, tel (0902) 24870.

Worcester (W & DARC)—3 Nov (Lecture), 17 (Natter night), 8pm. Oddfellows Club, New St, Worcester. Sec G4RBD, 14 Oakleigh Heath, Hallow, Worcester.

REGION 4—RR M Shardlow, G3SZJ, 19 Porleath Drive, Darley Abbey DE3 2BJ. Tel Derby (0332) 556875.

Derby (D & DARS)—5 Nov (Junk sale), 12 ("Cellular radio", G4YZQ), 19 (Video show), 26 (Visit by SMC), 3 Dec (Junk sale), 7.30pm. 119 Green Lane, Derby. Sec G3KOF, tel Derby 772361.

Derby (NHARG)—7 Nov ("Blowing hot & cold", talk by Ken Smith, a Chartered Engineer), 14 (Junk/Surplus sale and natter night), Fridays, 7.45pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec G4PZY, tel Derby 767994.

Glossop (G&DARG)—30 Nov (AGM), 7.30pm. Nags Head Hotel, Charlesdown Road, Glossop. Sec G4GNO.

Lough (L&DARC)—5 Nov (Chal night), 19 (AGM), Sec G1LZB, tel. Marshchapel 595.

Mellock (Tor ARS)—11 Nov ("Historic Avonlincs", Colin Baker), 25 ("My World of Amateur Radio", G4NAD), 7.30pm. Jackson Tor House, Mallock. Sec G1SDY, tel Mallock 3503.

Nottigham (ARCON)—6 Nov (Actively night), 13 (Cellular radio), 20 (Actively night), 27 (Actively night), 7.30pm. Sherwood Community Centre, Woodthorpe House, Mansfield Road, Nottigham. Sec G4PJZ, tel Southwell 814541.

Scunthorpe (SADARC)—4 Nov ("My trip to Norway", G4GZB/LA), 11 (AGM), 18 ("Worked All Britain", G4OGB), 25 ("Packel radio", G3TMD, AX25), 8pm. Grange Farm Hobbies Centre, Franklin Cres, Scunthorpe. Sec G4ZGJ, tel Scunthorpe 732268.

Workshop (WARS)—4 Nov (Workshop Club quiz night), 18 (Video night), 2 Dec (Junk sale), 7.30pm. Woodhouse Inn, Woodend, Rhodesia, Workshop. Sec G4ZUN, tel Workshop 486614.

REGION 5—RR J S Allen, G3DOT, 77 Rosslyn Crescent, Luton LU3 2AT. Tel 0582 508515 or al work on 0582 21151.

Cambridge (C&DARS)—7 Nov ("Design and construction of a tri-band antenna", G3KBR), 14 (Informal), 7.30pm. Coleridge Community College, Radeburg Rd, Cambridge. Details G4TRO, tel Cambridge 353664.

Cambridge (GUWS)—1 Nov (CUWS v Archimedes three legged pub race), 10 ("Broadband microwave antennas", Eric Clouston), 8.30pm, 15 (CUWS v Physics Society Quiz), 8pm, 16 (Field Day), 24 ("Developments in static communication systems", BT), 8.30pm, 30 (Christmas party). Trinity Hall seminar room 2/3.

Dunstable (DDRQ)—21 Nov ("Aspects of the weather", John Kellroy), 5 Dec (Junk sale). Room 3, Chews House High St, South Dunstable, Beds. Details P Morris, tel Dunstable 607623.

Leighton Buzzard (LLRC)—1 Nov (Talk by Alan Dyer). This meeting will be at the Vandyke Community Centre, Vandyke Road, Leighton Buzzard. All other Monday meetings will now be held at the Duncombe Arms ph, Great Brickhill, Beds. Details Debbie Jones, tel 0908 640238.

Milton Keynes (MK&DARS)—10 Nov (Junk sale), The Meeting Place, Hodge Lea, North Milton Keynes. Details G3ZPA.

Nene Valley (NVRC)—Wednesdays at The Prince of Wales ph, Well St, Flinedon, Northants. Details G6UWS, tel 0933 71189.

Shefford (S&DARS)—6 Nov (Unveiling of the club project), 13 (Club closed but a small "informal" meeting at Ashdon's hi-fi shop in Dunstable), 20 ("Where did you say you spent your holiday?", G3DOT), 27 ("Filler design", G6GOT), 28 (Annual Christmas dinner, The Kings Arms, Shefford). More details about the dinner and the club from G4PSO, 8pm, Church Hall, Amphill Rd, Shefford, Beds.

REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND. Tel 03677 503.

Harwell (HARS)—16 Nov (DF hunt), 18 (talk by Harwell Chemical Emergency Unit), 28 (Annual dinner). Harwell Lab Social Club. Sec G6MRP, tel Abingdon 848617.

Maldenhead (M&DARS)—6 Nov (21-Years dinner), 18 ("A bit of a lift", G3YLA), 4 Dec (Christmas social), 7.30pm. Red Cross Hall, The Crescent, Maldenhead. Sec G8RYW.

Slough (Burnham Beeches RC)—3 Nov ("AMRAC", G4ZRT), 17 Nov (Computer forum—bring along a machine/software), 1 Dec (Christmas dinner), 8pm. Haymill Community Centre, 12 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

Club secretaries in Region 6, please remember to let me have details of your meetings if you want to see them in this feature. **RR6**

REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Felcham, Leatherhead, Surrey KT22 9AZ. Tel 0372 372587.

Ashford (Echelford ARS)—10 Nov ("Rock bottom", G3MCK), 27 ("50MHz", G3COJ), 8pm. The Hall, St Martins Court, Kingston Crescent, Ashford, Middx. Sec G4VAZ.

Biggin Hill (BHARC)—18 Nov (Surplus equipment sale), 8pm. Downe Village Hall, 24 High Street, Downe, Kent. Sec G0AMP, tel 0689 57848.

Cray Valley (CVRS)—6 Nov ("Inmarsat maritime communications", G0FDZ), 20 (Natter night), 8pm. Progress Hall, Admiral Seymour Road, Eltham SE9. Details G3TAA.

Crystal Palace (CP&DRS)—15 Nov ("Contesting and the RSGB HF Contest Committee", G4BUO), 8pm. All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.

Dorking (D&DARS)—11 Nov (Informal, Star and Garton), 25 ("EMC interference", G3AEZ), Ashcombe School, 8pm. Sec G3AEZ, tel 0306 77236.

Kingslon (KDARS)—19 Nov (AGM and construction contest), 8pm. "Afriston", 3 Berrylands Road, Surbiton. Sec G3ODH, tel Epsom 26005.

Redhill (RATS)—18 Nov (Conversion of cb rigs to fm), 8pm. Constitutional and Conservative Club, Warwick Road, Redhill. Sec G8JXV.

Sutton and Gheem (S&GRS)—21 Nov (Test gear demo, G3MES), 8pm. Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4FKA, tel Epsom 21349.

Wimbledon (W&DRS)—28 Nov ("EMC", G3AEZ), 8pm. St Andrews Church Hall, Herbold Road, Wimbledon SW19. Sec G3DWW, tel 01-540 2180.

REGION 8—RR M Elliott, G4VEC, 20 Heysel, Sillingbourne, Kent ME10 4QE. Tel 0795 70132.

Chichester (GARG)—5 Nov (Club meeting. NB: This is a Wednesday), 18 (Junk sale), 2 Dec (Club meeting). North Lodge Bar, County Hall, Chichester. 7.30pm. Details G4EHG, tel Chichester 789587.

Grawley (CARG)—12 Nov (Junk sale, T S Cossack, London Rd, Crawley), 19 (Committee meeting at G4XHF), 26 ("Magazine production", G1VKF), 8pm. The Leisure Centre, Haslet Ave, Crawley. Details G4IOM, tel 882641.

Dartford (DDFG)—4 Nov (Pre-hunt meet), 9 (Club hunt). Pre-hunt meetings after 9pm, Horse & Groom ph, Leyton Cross, Dartford Heath. Details G8DYF, tel Greenhill 844467.

Edenbridge (EARS)—12 Nov (Junk sale), 10 Dec (Christmas dinner & presentation evening), 8pm. The Scout Hall, High Street, Edenbridge. Details G8VCH, tel East Grinstead 24748.

Eastbourne (Southdown ARS)—3 Nov ("Microwaves", G4PRJ), 1 Dec ("Operation Raleigh", G4RUL). Hailsham Leisure Centre, Chaiseley Home, Bolsover Rd, South Cliff, Eastbourne, 8pm. Various courses are held on Tuesday evenings. Friday night is chal night. Details G4XNL, tel Eastbourne 638653.

Gillingham (Bredhurst R&TS)—13 Nov. ("A packaging problem", G0DCA), 27 (Construction contest), 8pm. Parkwood Community Centre, Parkwood Green, Wigmore, Gillingham. Details G0AMZ, tel Medway 376991.

Hasillings (HERG)—19 Nov ("144 and 432MHz linears", G8VYR), 8pm. West Hill Community Centre. Various activities other nights. Details G4NVO, tel Hasillings 420608.

Maldstone (MYMCAARS)—7 Nov (Natter night, RAE and cw), 14 Nov (Iba), 21 (Natter night, RAE

and cw), 28 ("The use of club test equipment."), 8pm. YMCA Sportscentre, Melrose Close, Maidstone. Details G0BUW, tel 0622 30544.
Meopham (MPRC)—9 Nov (Surplus equipment sale), 7.30pm. The Club House, Vigo Rugby Football Club, Vigo Village, Nr Meopham, Details G6TXP, tel 04352-2403.

My thanks to the Edenbridge and Crawley clubs for the hospitality extended to me on my recent visits. RR8

REGION 9—RR A H Hemmelt, Rosehill, Ladock, Truro, Cornwall TR2 4PQ.
 Tel 0726-882 758.

Exmouth (EARC)—5 Nov (Construction competition), 19 Nov (Visit to Fire Brigade HQ, Clysi St George), 3 Dec (Christmas dinner), 7.30pm. Scout Hut, Marpool Hill, Exmouth. Details G4RUT.
Exmoor (ERC)—Meetings now held at the new club HQ, South Mollon Comprehensive School, Old Alswear Rd, S Mollon. Details G4JBR.
Redruth (CRAC)—6 Nov (Surplus equipment sale), 10 (Computer section "The new BBC Master computer"), G8JML, 20 (Constructors evening), 4 Dec (Christmas party), 7.30pm Church Hall, Treleigh, Redruth. Details G4USB.
Torbay (TARS)—29 Nov (Monthly business and "Looking at broadcasting in Plymouth", Mr Melhuish). ECC Social Club, Ringslade Road, Highweek, Newton Abbot. Details G1EUA.

REGION 10—H Phillips, GW4AKQ, 17 Penre Gardens, Grangeltown, Cardiff CF1 7QJ.
 Tel 0222 35848.

Abergevenny (A&NHARC)—Thursday nights 7.30pm, Pen-Y-Fal Hospital, Morse classes on club nights. The club is also a registered centre for the December City and Guilds RAE, 1986 and 1987. Sec GW4XOH, Tel 0873 4655.

Barry (BCoFERS)—Thursday nights 7.30 during school terms at the Annex, Weycocks Cross, Sec GW0AGA, tel 0446 736260.

Barry (RAF St Athan ARC)—Now sec GW0FJW. Tel 0448 750277.

Blackwood (B&DARS)—28 Nov (AGM), 7pm. Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Sec GW6YYR, PO Box 21, Blackwood.

Bridgend (B&DARS)—8 Nov (Radio rally), 10.30am. Recreation and Leisure Centre, Angel Street, Bridgend. Details GW10UP. Tel 0656 723508.

Bristol Channel Repeater Group (GB3BC)—Subs now duo. Contact sec GW6MBU, tel 0446 711146.
Cardiff (CRSGB)—9 Nov (Film show) 7.30pm. Paul Mawr Hotel, Tyla-Teg; Paul Mawr Estate,

Whitchurch, Cardiff. Sec GW0CU, tel 04463 3212.

Chepstow (C&DARS)—11 Nov (Junk sale), 18 (Video), 25 (Constructors night), 2 Dec (Natter night), 7.30pm. Leisure Centre, Chepstow. Sec, GW1FJ, tel 02912 2808.

Pontypool (PARS)—Tuesdays "The Settlement", Rockhill Road, Pontypool. 7pm. Visitors always welcome. Sec GW4RJA, tel 06333 72110.

Swansea (SARS)—14 Dec (AGM and buffet), 7.30pm. College House, Swansea University. Details from Sec GW4HSH, tel 0792 404422.

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Colwyn Bay (Conwy Valley ARC, GW6TM)—13 Nov (Surplus sale), 11 Dec (Talk Iba), 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Note: new sec GW4KG1, tel 0745 823674.

Dolgellau (Mairion ARS)—6 Nov. ("Remote-controlled aircraft", GW4KDP), 4 Dec (Christmas dinner), Dolserau Hall Hotel. Note: new sec GW4KDP.

Porthmadog (P&DARS)—20 Nov (AGM), 18 Dec (Christmas dinner), 8pm. Harbour Cafe, Ffestiniog Railway, Porthmadog. Sec GW1EGQ, tel 0766 2684.

Rhyl (R&DARC GW4ARC)—3 Nov (Activity night), 17 (Iba), 1 Dec (Activity night), 7.30pm. 2nd Rhyl Scout HQ, Vate Road, Rhyl. Note: new sec GW1PLI, tel Llandegla 621.

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pillochry, Perthshire PH16 5HH.
 Tel 0796 2140

Aberdeen (ARC)—7 Nov (AGM), 14 (President's Address), 21 ("Do you believe your Smoler?", Frank Dinger), 28 (RSGB, videos "World at your fingertips" and "World of amateur radio"), 7.30pm. 35 Thistle Lane, Aberdeen. Sec GM4GXD, tel Plicaple 251. During the summer, the club ran special event stations at the open days of the BBC's Beach Grove Garden in Aberdeen.

Aberdeen (Granplan Repeater Group)—Sec GM8VGL, 7 Fairview Drive, Danesien, Aberdeen, AB2 8ZL, tel 0224 702228.

Dundee (ARC)—Thursdays, 7.30pm. The club is now meeting again at the Kingsway Tech Annex, Grayham St, Dundee. 7.30pm. Sec GM4U2P, tel Dundee 644597 (Apologies for wrong number last month).

"Club News" is compiled from information sent in by club secretaries. If your club is missing ask your secretary why! RR12

REGION 14—RR T G Wylla, GM4FDM, 3 Kings Crescent, Elderslie, Strathclyde PA5 9AB.
 Tel Johnstone (0505) 22749.

Falkirk (FDRC)—First and third Wednesday of each month, 7.30pm. Grange Centre, Redding, Falkirk. Details from new sec GM4MCB, tel 0324 715624.

Motherwell (MLARS)—31 Oct ("Introduction to radio data", GM8JYJ), 28 Nov ("An evening with the regional rep" GM4FDM).

Note: Would all secretaries please report programme by dates shown in the header to the "Club News" section. RR14

REGION 16—RR A Owen, GR4HMF, 102 Constable Road, Ipswich, Suffolk IP4 2XA. Tel 0473 51319.

Braintree (B&DARS)—3 Nov (Junk and jewels sale), 17 (Iba), 1 Dec (Film show), 8pm. The Community Centre, Victoria Road (next Bus Station), Braintree. Details, G1NBV, 3 Coldnall-hurst, Braintree, CM7 7SL, tel 0376 44908.

Bury St Edmunds (BSIEARS)—18 Nov (Iba), 7.30pm. Westgate Primary School (off Hospital Road), Bury St Edmunds. Details Mrs. Chris Thorndyke, 23 Fordhams Close, Stanton, Bury St Edmunds, IP3 2EE, tel 0359 50271.

Chelmsford (CARS)—4 Nov (Junk sale), 2 Dec ("RDF to radar", B Noale), 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4KQE, 9 Abraham Drive, Silver End, Wilham, CM8 3SP, tel 0376 83094.

Colechester (CRA)—13 Nov ("IARU" G0CCI), 27 (BNOS demonstration), Alternate Thursdays, 7.30pm. Colechester Institute, Sheepen Road, Colechester CO3 3LL. Details G3FIJ, 29 Kingswood Road, Colechester CO4 5JX, tel 0206 851189.
Felixstowe (F&DARS)—3 Nov (Social), 17 (Visit to Gaumont Cinema), 1 Dec (Computer evening), 8pm. The Feathers ph, Wallon High Street, Felixstowe. Details G4YQC, 0473 642595 (daytime).

Ipswich (IRC)—12 Nov (Junk sale), 19 (Social), 26 ("Coastguard Service", C D Roche), 8pm. Rose & Crown ph, Norwich Road, Ipswich. Details, G4IFF, 76 Fircliff Road, Ipswich, IP1 6PX, 0473 44047.

Leiston (LARC)—4 Nov (AGM and Surplus Sale), 2 Dec ("Smile Chats", G3YMA), 7.30pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Details, G0CJX, Old Police House, Main Road, Benhall, Saxmundham IP7 1JY (XD 3222).

Loughton (L&DRAS)—7 Nov (Informal), 21 ("History of Laser 558"), 5 Dec (Informal), 8pm. Loughton Hall, Rectory Lane, Loughton. Details G4FKI, 44 Town Field Road, Filtwick, Beds. MK45 1JF.



Members of the Ballymena ARC on Rathlin Island with special event station GB2MRI, 6-10 August 1986. Albert Henry, G14CRL; Isaac Stewart, G14POV; Jeffrey Clarke, G14HCN; Stanley McIlroy, G14VJC; Hugh Kernohan, G11RBN; David Linton, G14KLH; Graham Hough, G14SFZ; Brian Sheepwash, G14KIS; Willie Glen, G14KUM; Tommy Wilson, G14VJZ; Aubrey Kinklad, G14TOR; Bertie Chesney, G14DC



Willie McClintock MSc, G3VPK, President of the RSGB, opening the Ballymena Amateur Radio Club's annual rally on 13 September 1986 at Balleo High School, Ballymena. L to r: Isaac Stewart, G14POV; Sam Caldwell, G13FY; Sandy Spence, mayor, seated behind G3VPK; Mrs McIlroy; Mrs McClintock; Albert Henry, G14CRL; Jeffrey Clarke, G14HCN

Norwich (NARS)—Wednesdays 8pm, Valley Drive Community Centre, 97 Plumstead Road, Norwich, G4RKK, The Collage, Hall Lane, Morley St Botolph, Wymondham NR18 9TB tel Wymondham 606979.
Vange (VARS)—6 Nov (Bring & buy), 13 (Film night), 20 (Cheese & wine), 27 (Natter night), 4 Dec (Bring & buy), Thursdays 8pm., Barstaple Community Centre, Basildon. Details Mrs D Thompson, 10 Feeling Row, Basildon, SS14 1TE, tel 0268 552606.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SO4 2NL, tel 0703 812435.

Andover (ARAC)—5 Nov ("Fireworks in the shack"), G4THW, 8pm, Wolversdene Club, Andover, Club net, 8pm, Tuesday evenings S18—G0ARC/A, Sec G0AMQ, tel Andover 51593.

Basingstoke (BARC)—3 Nov ("Constructors competition"), 1 Dec (Christmas social), 7.30pm, Forest Ring Community Centre, Sycamore Way, Basingstoke, Sec G4WIZ, tel Tadley 5185.

Bishops Waltham (Amateur Radio and Computer Club AMRAC)—7 Nov IQPn meeting, 8pm. Please note the return to The Crown, Bishops Waltham, Hants, Sec G6DLJ, tel 0703 847754 (Also Presid Mailbox 703847754).

Eastleigh (Ilchen Valley ARC)—7 Nov ("Microwave Modules"), 21 ("President's night"), G3VPK, 7.30pm, The Scout Hut, Brickfield Lane, Chandlers Ford, Club net, Thursday 8.30pm, S21-23-G6IVR, PRO G0EQG, tel Winchester 55339.

Fareham (F&DARC)—5 Nov ("RFI versus emc," Alan Dearlove), 19 ("QRP update"), G3CCB, 12, 19 (Natter night), 3 Dec ("Decoding morse with a micro", G6TJT), 7.30pm, Porchester Community Centre, Porchester Hants, Sec G3CCB tel Fareham 288139.

Farnborough (F&DARS)—12 Nov (AGM), 26 ("Chairman's Evening"), Railway Enthusiasts Club, Access Road, off Hawley Lane, Farnborough, PRO G4SBU.

Liphook (Three Counties ARC)—12 Nov ("HF mobile antennas", G3NDI), 26 ("Bonsai antenna jam", G3QLM), 8pm, The Railway Hotel, Liphook, Sec G0BTU, tel Petersfield 66489.

New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, contact G6DLJ, tel 0703 847754.

Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, contact Mr A L G Price, tel 0329 281852.

UK FM Southern Repeater Holding Group (GB3SN)—6 Nov (AGM), Chichester House, Shakespeare Road, off Popley Way, Basingstoke at 7.30 for 8pm, For information or to join the group and help support the repeater please contact Mrs Jan Steele, tel Fleet 613311.

Waterside (WSWC)—25 Nov ("Talk and demonstration on Amflor", G4SBF), Fourth Tuesday in every month, 7.30pm, Community Centre, Blackfield, Southampton, Sec G0BPA, tel 0703 893937.

Weymouth (SDARC)—4 Nov ("Packet radio revisited", G3VPK), 2 Dec ("Christmas Fayre with reminiscences of 25 years of SDRS"), First Tuesday in every month, 7.30pm, at Royal Engineers Training Camp, Camp Road, Wyke

Regis, Weymouth, Sec G1AHK, tel Dorchester 67596.

Winchester (WARC)—21 Nov ("Gelling started on 50MHz", G2DBT), 7.30pm, every third Friday at Durngate House, Winchester, Sec G4ZNO, tel 0703 772191.

REGION 18—RR Ian Gibbs, G4GW8, 61 The Gables, Widdrington, Morpeth NE81 5QZ, Tel 0670 790090.

Newcastle (Tyneside ARS-G3ZQM)—5 Nov (Informal), 12 (Activity evening), 19 ("Cellular radio", talk and demo), 26 (Informal), Scout Centre, Harbour St, Byker, Newcastle, Sec G4KOT, 091 234148.

Tyne & Wear RG (GB3TW)—The secretary is hoping to arrange three monthly meetings in the near future. In the mean time new members and donations are always welcome, Sec G8YWK, tel 0385 45425.

Sunderland (ARS-G4LPK G6BXJ)—18 Nov (AGM), Regular morse classes are in progress. Meetings Monday and Thursday evenings, Sunday mornings 11.30am, Sec G0ASM, tel 091 5288079.

REGION 19—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wansley Park, London E12 5EQ, Tel 01-989 6741.

Chiswick (ABCARC)—18 Nov ("New problems with Ivi", discussion), 7.30pm, Chiswick Town Hall, High Road, Chiswick, London, W4, Sec G3GEH, tel 01-992 3778.

Cheshunt (CDARC)—5 Nov (Natter night), 12 ("Radio control", G1MBL and G3WFM), 20 (Natter night), 26 (AGM), 8pm, Church Hall, Church Lane, Cheshunt, Herts, Club net on 144-535MHz, evenings 8pm, G4MGC, Secs J and T Walkins, tel Dane End 250.

Edgware (EDRS)—13 Nov (Lecture, G3RDG), 27 (Film show), 8pm, Wailing Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, Sec G4RMD, tel Hailfield 64342.

Feltham (TEMIARC)—New club, 4 Nov ("WX satellites"), lower bar 6.30pm, 18 (Natter night) upper bar 5.30pm, Thorn EMI S.S. Club, Mona Lane, Feltham, Middx, Details G1EHF, tel 01-890 3600 ext 2617, (day).

Graton (GRS)—Meetings at T S Wizard, White Hart Lane, Tottenham, N17, 8pm, second and fourth Fridays, Details tel 01-368 8154.

Harrow (RSH)—8pm, Fridays, Harrow Arts Centre, High Road, Harrow Weald, Sec G0DIN, tel 01-861 0419.

Harpenden (HARC)—4 Nov (On air), 18 IQn air, 25 (Oscillator night), 8pm, Silver Cup ph, Harpenden, Sec G1BJC.

London (Civil Service ARS)—3 Nov ("Oscar 10", G6GZ2), lunchtime, CS REC Centre, Monck St, London, SW1, Sec G6IMM, tel 01-698 4437.

London New Scotland Yard (ARS)—Not open to the public, but the club station is active from time to time using call G4NSY and G6NSY, Sec, Room 99, New Scotland Yard, SW1.

Southgate (SARC)—13 Nov (Home brew contest for the G6OM trophy, also slide show) 27 (Informal), 7.45pm, Holy Trinity Church Hall (Upper), Green Lanes, Winchmore Hill, N21, Details G4YLL.

Herts (SW Herts UHF Group)—This group runs GB3HR RB14 and GB3SWM on 10-368GHz at

Bushey Heath. The gang are also building a 432MHz beacon/repeater, GB3BH which should be on air by the time you read this. The group is available to give talks. Contact G4KUJ. Donations for the building fund will be gratefully received by G3THQ.

Uxbridge (Brunel UARS)—New club, Qcl/Nov/Dec: The Shack will be open every lunchtime behind the Students Union. Basic tuition and morse classes held, Nets nightly 8.30pm on 144.710MHz, Sec G6ZYT, tel Uxbridge 39125.

St Albans (Verulam ARC)—11, 25 Nov ("The role of the radio amateur in emergency planning", Herts County Planning Emergency Officer, 8pm, 15 (Club contest 1-8MHz 2000-2359gm), 23 (Club contest 0900-1300gm), RAFA HQ, New Kent Road, St Albans, Herts, Sec G4QBH, tel St Albans 52003.

Walswyn (WHARS)—3 Nov ("3.5MHz cw QRP construction", G3BYG), 17 (Construction comp), 8pm, 9th WGC Scouts Hut HQ, Knightsfield, WGC, Nets held on 144.375MHz Monday, Sec G0AII, tel 0707 326138.

Notice of closure. It is with regret that I have to inform readers that the Wallford Radio Club has ceased its activities through lack of support. Some ex-members meet in the saloon bar of the Beaver ph, Leavesden, every Wednesday at 8.30pm. Details G3YXZ, tel Kings Langley 65490. This is the second club in my region to close in the last year through lack of support. There must be a moral here for other clubs. RR19

REGION 20—RR C R Hollister, G4SQQ, 34 Battersby Way, Henbury, Bristol BS10 7SU, Tel 0272 508451.

Bristol (BRSGBG)—24 Nov (Home brew competition), 7.30pm, Small Lecture Theatre, University of Bristol, University Walk, Clifton, Bristol, Details G4SQQ, tel 0272 508451.

Bristol (North Bristol ARC)—14 Nov ("Sporadic E", G8UUE and G8VPG) 21 (HF activity evening), 28 (CW activity evening), 7pm, SHE 7, Broadmar Cres, Northville, Bristol, Details G4YQQ, tel 0272 690404.

Bristol (South Bristol ARC)—5 Nov (Club fireworks and Bar-B-Q, G4WUB), 12 (HF activity, G0FFY), 19 (Home brew wine sampling G0CEE), 26 (Microwave activity evening, G0AWX), 7pm, The Whitechurch Folk House, East Dundry Road, Whitechurch, Bristol, Details G4RZY, tel 0272 834282.

Cheltenham (CARA)—7 Nov (Junk sale), 21 ("Any Questions?"), 7.30pm, Stanton Room, Charlton Kings Library, Cheltenham, Details G4VXE, tel 0242 26723.

Gloucester (Gloucester ARS)—12 Nov ("Microwave workshop" with Microwave Society), 7.30pm, St John Ambulance HQ, 2 Heathville Road, Gloucester, Details G6AWT, tel 0452 504515.

Weston-super-Mare (WsmARS)—10 Nov ("Packet radio", G8IMB), 24 (Constructors night), 7.30pm, The Bristol Hotel, Locking Road, Weston-super-Mare, Details G1DJW, tel 0934 514429.

Yeovil (Y&DARC)—13 Nov ("Oscilloscopes 2", G3GC), 20 (Junk sale, G3GC and G4WMV), 27 (Activity night), 4 Dec ("Sunspot cycle 21", G2FK2), 7pm, The Recreation Centre, Chilton Grove, Yeovil, Somerset, Details G3GC, tel 0935 75533. RR20

THE Members' Ads

PAGES

FOR SALE

MULEK TVVF144A 10m 7m transverter little used, as new. Bargain only £140, or consider swap for 2m or 70cm FM mobile rig. Condition unimportant as long as working. C4UHR not OTHR tel: 0245-468149 evenings and weekends.

HCAIHK11 SB650 with manual and spares, digital readout unit for SB series RX and SB/RW series tevers except ORP units £55 inc p/p ono plus p/p. C3HA OTHR.

F1107R transverter fitted 6 metre 70 cms modules on condx little used boxed and manuals £300 ono plus colour Genie computer as new software includes R11Y TX/RX software games Intorlaea boxed £55 ono. Both items delivered 50 mile radius Derby. C4XA0 OTHR, Derby 792140 after 5pm, or Nottingham 866462 8 am/4.30 pm.

NEUBRAIN computer model A x2 c/w manuals, tapa, PSU, £40 each ono. Also disc controller for suit above £90. Lots of software and books, please enquire. Buyer collects or pays postage. Tel: 0773 831361.

FL21002 LINFAR 2 years old. 15 mins use £95 ono. 1fl mini beam, 2-cle F95, Hansen pwr/swr bridge 144/430MHz F35. YAESU FT220 2 metre base rig £175. CODYL OTHR, tel: 061-336 6514.

DISCS: NEW 5.25 inch. 1en lor £8.50 incl p.p. Wiltshire, "Bramblings", Pelican Road, Pamber Heath, Basingstoke, RG26 6EL.

HCAIHK11 HR-1680 SSB/CW RX £35. KW Vanguard 1X £31. FT1102 tevr F375. Brighton 418755.

IR10 TS780 dual-band multi-mode TCVR, F680, Droke SPR4 HF RX 24 hall meg. bands including all amateur F140, Eddystone EC10 HF RX F35. All with manuals. E. Bailey, GMBBA OTHR daytime phone number 0698-283692.

BIRD THIRULINE c/w VHF and UHF elements vge F380, Black Star 1GHz freq. counter c/w manual vge F120. 80t LDF450 heliax equivalent c/w connectors F85, Sony HVS2000 vldro mixer still boxed £80. C4E1N OTHR, Tel: (0278) 683300 or Prestel 278683300.

SONY ICF2001 receiver, FM 76MHz to 108MHz, AM/SSB 150KHz to 29.999MHz computer controlled tuning 6 memories direct key input ideal radio for 11st time swl F130, Call Cordon G81PR OTHR, Tel: 01-864 8261 any time.

YAESU FT1901DM, matching speaker YAESU FC902, good condition £600. GATSV tel: 0287-6A236.

ACOUSLIC MODFMS; 1200/75 baud, ideal for Prestel/Micronet and RSCB Databox £30 ono. Also 300/300 baud lor access to bulletin boards etc. £30 ono. Andrew, GIMEA, OTHR, tel: (0535) 600034.

HFAIHK11 CR-11D VHF scanner, xtal'd lor 58 and 514 to 570 c/w manual £25 ono. MAXCOM 20E tevr F25 ono. M/H 432MHz evtr F25 ono. 511m-Jlm ant F3. All above in g/e. Tel: (0392) 31941, 8RS87801 - Ricky.

COMPACT 2m VALVE LINEAR, 10W in 300W out, built-in pre-amp, £250. IC471 25W, int psu, £670 or p/exch for IC402 + easli. C1FCG, OTHR, tel: Great Missenden 2752.

ELH 2600 A11neo 2m 60W 11linear, 1-3W drive, switchable pre-amp and 10V aux skt lor portables, £55, C4WIF, OTHR, tel: Medway 221061, after 7pm please.

YAFSU FT203 2m handheld, vge, £135. Geoll Groom, C3VLC, tel: Buckingham 817496.

F1290 c/w nleads, mic, solt-case, strap, boxed, vge, £220. F1690, 8 months old, boxed, vge, £220. Fully protected psu, 6A 13.8V, F35, Spectrum 1A651, RF omp plus RP65 pre-amp, F45, Graham, C4VEW, OTHR, tel: Kildsrove 5020.

RACAL RX RA117, 1X MA79, pre-silretor MA1978 1-30MHz, swr bridge MA152, all wkg, vge, £500, will split, p/exch considered, photo available. G4L10, OTHR, tel: 0705-373320.

IEN-IEC ARGOSY 80m-10m, SSB/CW, 50W RF, vge, F275. Dave, C4UVJ, OTHR, tel: Canvey Island 697978.

TS830S, condx as new, 21 months old, CW 11lter fitted c/w manual and orig pkg, £650. Cone ORP. C4AKUS, tel: Swansea 466383.

YAESU FT1012D 1CVR, all new bands, 1on, m/c, manual, F450, Spectrum + 48k computer, compatible t/revorder, tapes, books, F90. Mono 1V, portable, National, 11 required, F40. All ex condx, as new, C42BCH, OTHR, tel: 0792-41682.

IR10 TS130S, as new, £450, Drae 30A psu, £100. Access G20YM dipole, 2011 A1 masts, guys, F100. White stek closing down. Taylor, tel: Salisbury 780396.

YAESU FT757GX, vge, 2 years old c/w MH-198 h/m/c, F595 ono. Yansu FL110 solid state 100W 11near amp, 160m-10m, £95 ono. C4ARI, OTHR, tel: 0530-243258.

CSRV with 4 bed modern house attached, 400' asl, 9 miles NE Birmingham city centre, gos c/h, good decorative order with or without carpets, curtains and kitchen optionees, £58,500 ono. C3XXJ, OTHR, tel: 021-351 2370.

BARCAIN - Yaesu FT207R, 2m handheld 1CVR, keyboard microprocessor c/w case, helical antenno, Sanyo ehgr, YH-24 spkr/m/c, MC-2 quik ehgr/dc adaptor, set recently serviced, F190 the lot, no oilers, Taylor, 1 Morewarren Close, Milton, Wilts, SP2 0LV tel: 0722-744133.

F1980, 11lterd oil 11lters and Curtls keyer, perfect and as new, F1,100, FT726 with 2m/70cm/sat F950. Buyer inspects and collects. C3IMP, OTHR, tel: 0952-812134.

SX200 SCANNFR, vge c/w leads etc, boxed, F175 ono. PFI RX, xtalld R86, wkg but needs retune c/w mobile ehgr/amp, £7.50. Alon, C810K, OTHR, tel: 01-643 1767.

TR10 1R2600E, 2m FM 1CVR, DCS system, solt ease, incl 6XAA nleads, F200. Dave, C4AUGF, OTHR, tel: 0382-65205, evenings.

AMSTRAD PCW 8256, CPS 8256 serial/parallel Interloc, dust cover set, 1001l discs, "At Last" database, "New-word" word processor, value £680 will accept £500. AMI-2 all mode Intelligent t/unit, £200. PK-80 packet INC, £180. C400K, OTHR, tel: 0268-418058, home.

YAFSU FT780R 70cm multimode, F250. MH1144/1296 tvtr + 23-cle Tonna, F200, YH4000XB R11Y 1CVR, F100. Heathkit SB101 fitted CW 11lter, v/o faulty but ext FT200 v/o incl, F130, VIC-20, unused, £25. Carriage extra, could deliver London SE. Alastair, C4RUL, tel: Eastbourne 503618.

IR10 TS830S, 1mae, eoscaded narrow CW 11lters, F700, G4FFD, OTHR, tel: 0432-71374.

IR10 TR7500 2m 15W mobile 1CVR c/w Yaesu YH-1 headst and boom/m/c, homebrew switch box, boxed, manual, can deliver within 150 miles radius of Bristol, £150. G8YML, OTHR, tel: 0272-563491.

2KV PSU, other parts lor HF 11near, F25. 10m-4m tvtr, F20. 10m UR67, £5. Cassette recorder modified lor MS, £10. 80W 2m pa, needs attn, £20. 10W 2m pa's, one 11near, £10 eo. All ono. G4AOL, OTHR, tel: 0734-666153.

TANDON TH100/2A d/s d/d disc-drive, as new c/w spares & manual, £45. 2011 Dragon 32 computers, one OK one faulty c/w manual, Solf books on Dragon

one OK one faulty c/w manual, Solf books on Dragon and demo cartridge, F50. Commercial psu +5V @ 2A, +12V @ 1A, -12V @ 1A, +24V @ 500mA and 5V floating @ 100mA, F15. Minns 600-50 ohm balun, 1.5-30MHz, 750W pep, F10. 4-cle 70MHz Jaybeam, new, £15. Components worth over £1,500 incl 8/16 bit processors, peripherals, RAM, EPROM, 11L, 74LS, CMOS, xtals, A-D, D-A, S/H, specials, op-amps, regulators, diodes, transistors etc, not junk or surplus, F200, S100 bus extension board, F10. 12011 3.5" single-sided discs, F8. Ian Forse, tel: 0202-825727.

ICOM IC3200E dual-band 2m/70cm 1CVR, incl speech synthesiser, mobile mount, dual-band antenno, mint boxrd, F395 ono. Yaesu FT290R 2m multimode with mulek c/w nleads, ehgr, approx 1h use, boxrd, F245 ono. BN05 LP144-3-50 11near amp/pre-amp, almost unused, £90 ono. Icom IC02E Mk2, Improved CPU model, 7m handheld, 5 mins use c/w unused spkr/m/c, battery box, mobile charging cord, all boxed as new, £250 ono. C4PAR, OTHR Bcdlordshire, tel: 0587-606983.

YAESU FT1012, 9-band 1CVR, mint condx c/w m/c, lan pr ol new PAs, £425. Pre1rr buyer inspects and collects. G-whip Flexiwhip c/w coils for 20m/80m, unused, F30. C3NJP, OTHR Kent, tel: Cranbrook 714482.

TS830S 11lterd YG455CN CW 11lter (250Hz), SP230, Shure 444, spare PA valves 614GB5, 1mae condx, F800 ovno. Shlmiz 551055, all options, vge, F250 ovno. G3ZFZ, tel: 0229-44147, after 5pm or weekends.

YAESU FT1012 HF TCVR, AM/FM, 11lters 11lterd, FC102 atu, FV1020R remote digital v/o, SP102 spkr, FV107R tvtr 2m/70cm modules 11lterd, all as new condx, unused 18 months, sell boxed complete, F1,150 ovno, going ORI, USA ancil. included. G4SV0, OTHR, tel: Farnham Common 3669.

W338 SE1S, spare valves, £40 the pair. RF26 unit, £5. Stereo valvr amp/tuner etc, £40 - £75 ono the lot. WANTED: 70cm-10m rx evtr, suitable lor use on satellite bands, homebrew or commercial. G8AIE, OTHR, tel: Leicester 328842.

RACAL RA17 RX, 11ke new, manual, £149. FAX Multirad TX type D901FM, ex £45. Multirad Muxor RX D900FM with paper, £49. R11Y t/unit CCRF F510, F15 A1&E tuning scope F5CR, £15. A1&E regen rprater TRR2, manual, £10. Creed auto TX 656H, F12. Leak stereo amp & tuner, £19. Stuart Turner mains pump, £12. Lots more gear, ehokes, transformers etc. B L Cedar, G8BPM, OTHR S, London, tel: 01-653 8489.

COMPLETE HF STATION: TS130S 1CVR, 11lterd YK8BC and YK85W 11lters, PS30 psu, MC35S m/c, FC707 atu, HI-O balun, £600 ono. G3LIV AK10R/R11Y t/unit for BBC with ROMs, F100. MHL144/30-LS, F50, All equipment in vge and boxed. C4IAC, OTHR, tel: 06755-2745.

1950's USAF scanning RX APR4Y, CV253/ALR, 38-1,000MHz manual or motor tuning, 230V ac, 28V dc, vge, £85. Servomek ac mains stabilizer, heavy, £5. Buyer collect please. WANTED: 3A2P31 ert lor C1436, scope. G8LIU, OTHR, trl: CB95-30006.

RACAL equipment, truly as new, RA117E/S, F250. LF137/S, £50. MA168/S DIV55BS, £40. MA197B/S, £50. MA150B/S synthesiser psu, F40. Various scopes RXs, transformers, valves, cheap to clear. Callers to test and collect. B111, 11 Union Street, High Barnet, Herts, EN5 4HY, tel: 01-440 3534.

TS930S, ge, serviced by Lowe Electronics, F1,000. Vertical antenno 14A4V, £30. C4SSX, OTHR, tel: Rutslip 630627.

KW204 1X, KW202 RX, KW E-2ee Match atu, Shure m/c, spare valves, F250 ono, may split. Prefor buyer inspects/collects. Mokka, tel: Reading 487559.

RAF Aircraft RX type 78 with comprehensive installation details, eets etc, £15. US Navy KW2 portable TX/RX type CR1-43007, £70. BBC mobile airbord 1CVRs, one RX wkg on 120.5 plus other

10r spares, £15. Buyer collects. Martin, CANCE, QTHR, tel: 021-357 6139.

WELZ 5P380 pwr/swr meter, 1.8-500MHz, 20W/200W, dual sensors, boxed n/w instructions, £40. Microwave Modules MML70/144 4m tvtr, £55. Tonna 144MHz 9-ele Yagi, 50 ohms, £8. Steve, GAAAL, QTHR, tel: 01-668 3386, anytime.

SOLARIRON C01400 scope, twin-beam, dc-15MHz with manual, vgn, £55 one. Creed 444 printer, brand new, £40. G4LSA, QTHR, tel: 0785-74388.

FT790, nlcds, nhgr, boxed, £295. MML432/30 11near, £110. 70cm 15XV Tonna with power-splitter RHP, £35. 1H21E, vox, headsat, nlcds, chgr, boxed, £170. FT720RWH 2m FM mobile, 25W, 4m remote cable, £100. 2m 9XY Tonna, £30. G4SBK, QTHR, tel: 02303-719.

80m/160m, 68/58' telescoping tuning vertical c/e h/duty insulated base, earth rod, guy insulators and attachments, 160m 2.25"-0.25" taper, 10' sections, ex DX antenna, £50. n/w h/range arranged. G4E2G, Somerset, tel: 0963-51133.

ICOM 740 HF all-band tvtr, CW-FLS3 55B-F30 11ters FM board, marker board, factory fitted extras, occasionally used mobile only, hand/mn, manual, n/w marked mnt condx, £595. G4POP, QTHR, tel: 0734-732384, Sat/Sun evenings only.

MICROWAVE MODULES 144MHz 100W 11near, £105. Meteor 600MHz frequency counter, £115. CANTY, QTHR, tel: 061-790 7673, alter 6pm.

HI-MOUNT BK100 Morse key, £10. 5-band dipole using Reyco high '0' coils and W2AU big signal balun with lightning arrestor, £15. RITY PAG 2/unlt, roddy built, perlent condx, £45. CH4USY, QTHR, tel: 0382-543082.

1EN-TEC C0R5A1R, ex performance, ex condx, incl psu with built-in spkr, CW/55B filters and kayer, £895. TET HB33M 3-ale tri-band minl-beam, graat performer, 6 months old, vgc, £150 ono. Phil, tel: Grovesend 64224.

GARRARD 401 turntable plus SHE arm, parspos plnth, ellars? C4LUO, QTHR, tel: Newington 842127

YAESU FT1012D, FV1010M, Katsumi keyar, LPF, spare voloes, £625 no splits, pralar buyer collects. AR2001 scanner with psu and discome, £250. G4P5F, tel: Saltcoats 62955, alter 7pm.

MMY144/28R, 144MHz 11near tvtr, less than 3 months old, £200 ono or exch for 2m handheld or ICS AMT-2 unit or AX25 1NE packet unit. 5ansible offers only please. G4RKO, QTHR, tel: Newbury 60263.

AHT1 with CW recelva and aparata psu, £180. Interface and EPROM for CBMG6, £30. CBMG6 with t/recorder and CBM1520 4-col printer/plotter, £150. CBM1701 colour video monitor, £110. All manuals, books etc, will sell as complete AMTOR/R11Y stn, can be seen wkg, £450. TET HB33M beam approx 17'x10', £100. Altron tlt-ovar mast, extends 30', £100, buyer collects. G4LXN, QTHR, tel: Chipping Sodbury (Aven) 318528.

RACAL RA-17 RX, £140. Regatran Laboratory psu, 0-35V @ 15A, vernier control, full o/oad protection, £35. BC-221T, orig charts, internal psu, £20. Wavemeter Class-0 No1 MK2, £10. Pyo Bantams, hi-band FM wth battery, toys, mcs, net, alignment data, £20. Yoesu FT101 MK2 TCVR, orig condx, £240. T5323UR 1reg meter, 20-500MHz, orig charts, internal psu, £40. Advanme 01/0 slg/son, 10-300MHz, £15. Heathkit Antenna 50 ohm dummy load, £15. Airminh Radl-vot type 211, 0-15MHz +85MHz, internal scope, manual, £25. Vibroplex semi-auto bug-key, £35. Linaor amp (2501H) and 2.5kV psu, homo-built, very high standard, case needs completion, otherwise complete, £65. Similar standard atu, 3.5MHz/7MHz end-lod/doublet aerials with National Velvet Vornlars, £25. Eddystone EC-10, mains psu, £45. Valves new boxed: TR5, 155, 114, 1L4, 3A5, 354, 12AX7, £1.25 ea; 0QV03-10, £5; 0QV03-20A, £10; 0QV06-40, £25. Ex equip: 5B254K, £2.25 ea; 0Y3-125, £7.50 ea; 4CX250B, £20.50 ea; many more types. Wide-spaced vari-Cs, 500pF 3KV, £10 ea. Fixed Cs, 0.0001 3KV, ideal 11near tanks, 75p ea. Nems-Clear RX No1302, S3-260MHz, AM/FM/CW, £175. Cossor transistor tester No1325, £25. R1v111n transistor bench psu, 0-30V @ 1.5A, mtcreed, £15. LPFs Minlmitter/KW, 50 ohm, £7.50 ea. Sanky 5nper 8 sound cine namera, new unused, cost £220, £751 Buyer collects/pays carriage. WANTED: Mobile mount lor FT290R, G3MDE, QTHR, tel: 0242-524277.

FT707, FV707, FC707, mobile mount and anning/mic in boxes, almost unused, £460. IC02E with hand/mic £190. IC4E, £160. Modnar Electronics tvtr, 70cm 2.5W c/p 28MHz 1/p, £40. G8CJY, NO1 QTHR, tel: 0708-45733.

YAESU FT707, matching psu, FC707 atu, transmatch atu, FV707 2m tvtr, FV707DM vlg, YK35 anning 11st/mic, mobile mount, TET 10m/15m/20m vertical,

GOC RITY lor BBC, ex condx, bargain at £600. Martin, RS52903, tr1: 0626-62034, anytime.

MM144/28 tvtr, as new, £95 ono. SEM Sentinel MF pre-amp, hard switching, £12. Astatic D104 mln, £35. Marnoni roller-coaster c/w counter, £65. Servomex stabiliser AC7 MK2, 195V-265V @ 32A, £25. Bnyer collects. Martin, G3Z25, QTHR, tel: Plymouth 707550.

BKDS LPM3-100 VHF 11near, ex condx, nearly new, also Welz 3050 30A psu, ex condx, £300 ar will split £150 ea. Pye PF2UB Pocketone, spare nlcd, fully xtalld 0V/NH/SUB, £50. G1E1V, NOT QTHR, tel: 0602-274302, after 6pm.

KW2000B plus psu, vgc, £180. Uniden 2020 1CVR, 80m-10m, vgn, £250 ovno. AR880, not ex-services, superb appearance/performance n/w matching spkr, phones, 1u11 set spare valves, handbook, £120. Bnyer collects. G2AC2, QTHR Lincolnshire, tel: 0521-73233.

TELEREADER CWR-610E, CW/RITY/ASCII/CP, ex condx, £120 ono. VFD120, unused, £50 ono. Moden EMT translermer, 1250V-1000V-0-1000V-1250V @ 300mA, heavy Dllars? OFC230 digital controller, as new, allars? C4MYA, QTHR Merseyside, tel: 0744-22647.

YAESU FRG7700 RX, without memory, FRA7700 antive antenna, £250. Heathkit SW717 RX, gc, ideal lor beginner, £50. Wood, tel: Clochan 378.

FT790R 70cm multimode, gc c/w nlcds and case, no mads, £290 ovno. G4Z01, tel: 0953-607594.

ACTIVE FILTER, Daiwa all-mode active filter notch, band pass, PLL, 55B and CW c/w box & instructions, new cost £99.82, bargain price £60. WANTED: Kenwood SM-220 monitor. Graham, G4VOE, QTHR, tel: 061-740 4126, anytime.

CENTRONICS commercial quality printer, vgc, 17" wide tractor drive, £90 ono. Buyer collects. G1FDL, QTHR, tel: Leeds 866435.

SONY ICF76000 RX c/w psu, antenna, manual, orig box, gc, £125. Nigal, BR587947, QTH Hants, tel: 0703-433642.

OSCILLOSCOPE: Trio CS15664, 20MHz dual-trace, truly excellent mechanical and electrical condx, 10cmx8cm graticula, 2011 x1/x10 probes plus handbook, £179 incl carriage mainland. 1200lf ICs, 20p oa plus SAE please. Reed, 20 Morton Road, Brighton, Sussex, BN1 7EA.

YAESU FL2100Z HF 11near amp, 11tla used, ex condx £400. G43UYR, QTHR, tel: 0738-35626.

SOMMERKAMP FLDX500 TCVR, ex condx, RX incla adda options 2m/6m, all connectors, spkr, mic, instruction manuals, unused spare valves TX & RX, buyer collects, £200, Nolan, tel: 06662-2388.

ICOM 471E, vgn, £600. Hardly used lcom 271E, mutck SML, vgc, £650. Both in orig boxes. Mm Morse Talker, £60. G1AAM, QTHR, tel: Newhaven S15243.

PCR RX, gmo with built-in psu, £25. AR880 RF section only, complete, £20. OST from 1970-1985, clean and complete, sensible offers please, all buyers collect. G3D0J, QTHR, tel: 06286-2810.

KENWOOD TS711E c/w mic, cables, ona yaer old, ex condx, £575. G4FDX, tel: Toddington 2166.

MICROWAVE MODULES 10m RX pra-amp, £15. Creed 444 teleprinter, £40. Pye B4M portable 14" TV, £45. 5abtronics digital LED readout multi-meter c/w manual, leads and ac adaptor, £60. Yoesu FT200 plus FP200, ex condx plus spare set of valves, £250. G4KZ2, QTHR, tel: Coventry 444160.

ORT DUE TO ILLNESS: All main rigs and antennas sold locally, following now offered, all bought new in mint ex condx. 'Rolls-Royce' ol pwr meters, Hansen FS-710N, £50. Oatong ASP/A plus psu, £50. Oatong FL3 plus psu, £70. Oscar 2, SMC mod, 40ch 10m FM, tested only, unused plus SMC psu, £30. Mandhuck AOR245 c/w car/mains chgrs, ext spkr/mic, rubber duck and telescopic antennas, 2.5W RF, new battery fitted (Lowe), short period use overseas only, £120. G3ES0, QTHR, tr1: 0980-23001.

NEW & UNUSED GLB Packet Radio TNC, manuals, leads, software in ROM, £165. Also Anadex det-matrix printer modal OPS000, £125. Jehn, tel: Orpington 37955.

YAESU FRG7700 RX, 11tld 12 memories, FRT7700 atu, FFS filter, as new, boxed, £300. G6LXM, QTHR, tel: Retherham 555624.

KENWOOD/RI10 T58305 tvtr, vgc, £675. GARUO, QTHR, tel: 0246-36756.

PROPERTY LATE G3YD: Sommerkamp FT277 (FT101B), gmo 12V leads, 444 mla, 2011 sets PA valves, manual, 1K Ezeer-match, KW pwr/swr meter, 160m atu, antenna coax switch, grid-dip meter, KW 1:1 balun, £250 complete stn, buyer collect ar carriage extra.

GACKJ, QTHR, tel: Coventry 366542.

COAX RELAYS, Magnetin Devices type 951, 12V coil, fitted with short coax leads and 2011 BNC sockets and 1011 plug, £5.50 ea incl postage. G4BEZ, QTHR, tel: Hook (025672) 4943, evenings only.

DAIWA CMW419 atu, 500W pep, accurate cross-needle metering of lerward, reflected pwr/swr at a glance, 17 switched inductor settings match a wide impedance range, ideal G5RV antenna etc, mint, boxed, £120. C4WXF, QTHR, tel: 056884-580, alter 6pm.

SHACK CLEARANCE: 2011 AV0 8, gc, £10 ea. Marnoni Industrial TV equipment type B0871A c/w namera, monitor, psu, £20. Teletype 33 c/w handbook lor spares, £10. All ono, buyer collects. G30ZY, QTHR, tel: 01-841 2575, alter 6pm.

YAESU FT207R 2m synthesised scanning handheld c/w nase, spkr/mic, nhgr, some spare batteries, all in orig pkg, very little use, £170 ono. Microwave Modules MML144/100L5 2m 100W 11near, 1-3W 1/p, switchable pra-amp, gc, £125 ono. G4NSN, QTHR, tel: 01-578 4611.

FT290R c/w 2 sets nlcds, mic, chgr, case, 1/whip, slide mount, YH-1 headset, 5B-2 PTT switch, £265. Yoesu FT2F 12ch 2m TCVR, 10W o/p c/w psu/spkr, £50 8ch 2m scanner c/w nlcds, chgr, £30, Laurie, G15WL, QTH N London, tel: 01-607 4124, evenings.

TR10 R1000 RX, mint condx, manual etc, £230 ono. 5EM Europa C tvtr, mint condx, manual, with adaptor plug lor FT101 series, £95 ono. Buyer collects. G3FK, Ferndown Dorset, tel: 0202-873175.

FT1012D all 9-bands FM board fitted, fan, mic, little used, vry gc, £475 ono. Kan 501, G4FOY, QTHR (Alton Hants), tel: 0420-82855.

DA10NG MORSE TUTOR, £35. Jaybeam DS/2M, £15. Winch geared 12.5-1 drum with nylon rope, approx 0.5 tonne swl, £25. G1FGS, QTHR Bournemouth, tel: 0202-422916.

TR10 T54305 fitted with YK88A, YK885, YK885N, YK88CN and FM filters, £700. 2m 80W 11near amp, £80. Jaybeam VR3, 10m/15m/20m vertical antenna, £25. WANTED: Trio T59305, G0COY, QTHR, tel: Leicester 773908.

TR10 R2000 RX c/w Mizuho KX3 atu, MML144/28 cvtr, 11tla used, ex condx, boxed, £450 ono. Molmas, Northants, tel: 0536-726207.

FT290R, carrying case, nlcds, chgr, mint, £235, G6WNG, QTHR, tel: Earlswood (Warks) 2449.

FT290R + mutok, superb eondx, £290. 144MHz 11near 4CX250B + psu, 400W, £330. 70cm DL7YC to use with aam psu, 300W+ o/p or 500W in CW, £210. Selling due to career. Richard, G6HKS, QTHR, tel: 0945-584640.

APRICOT PC, 512k RAM, 2off 720k discs, orig software, database etc, orig boxes, hardly used, offers? G4CEQ, QTHR, tel: Oonland 55908.

SILENT KEY SALE: Trio R600 RX, new last March, £250. Rocal RA17W, £160. Both ono. Gaary, tel: 0455-636644.

FT290, carrying case, YH-1 headset, MML144/25 amplifier, £250. G3ZVC 55B generator board, 9MHz, £15. PBW18/70cm, £5. Buyer collects. Sentinel 4m cvtr, 28MHz 1/p, £5. G4CHU, Surrey, tel: 07373-54497.

FT707 MF 1CVR, boxed with YH35, £325. MT240X multi-band dipole, £25. FT2700RH, duplexer, dual-band mobile antenna, mag-mount, all brand new in boxes, £470 the lot. WANTED: FT757, T54305 etc MHY7 G4G25, tel: Rugby 815506.

TR10 9130 all-mode 1CVR, ex condx, £350. Anadrx serial/parallel printer, mint, £50. Experimenter's computer UK101, dual-beam oscilloscope type 43, needs slight ottn, £50. G61HC, QTHR, tel: Burgess Hill 43505.

S8200, £250. KWH2 + psu, £300. 75S1, £100. Eddystone 830/9, £50. Amstrad CPC464, green-screen DMP1 printer, £165. DFM 600MHz, £90. 1A33 Jnr, £40 1com 10m FM, £15. OFM 30MHz, £15. Shure 444, £20. G3WWD, NO1 QTHR, tr1: 0603-46348, 8am-4.30pm weekdays.

TELEPRINTER, IIT Creed 2300/5, Integral perforator and reader, xtal conversion to 45.45 c/w stand, 2nd machine, auto tape winder, auto page winder plus other parts, paper etc, offers please. Graham Down, G3XBD, QTHR, tel: 0322-862736.

ROTOR, suitable 2" mast, top, top-bearing, controller, £40. Mobile mln, £10. 7/8 whip, gutter mount, £10. 9-ele Tonna, £8.50. 2011 2" alloy poles plus brackets, £20. 27yds UR67, new, £5. 17yds s/h, £3. 18yds, £3. Books, £1.50. G4UEE, tel: 0509-262957, evenings.

ONE TO TIME MASTERS: my Sharp MZ80-K and Epson RX80F/1 is available again c/w software (ladder, business and games), desk, 1500 sheets tractor paper, manuals etc., no split, £250 ovno. Terry, G6MLJ, tel: Basildon 557443, evenings and weekends

YAESU FT209RH, 5W handheld, soft case, NC-18C compact chgr, £200. Trio 1H21E, smallest handheld, soft case, spare nicad, dc cvtr/adaptor, boom mic/headphone with vox, BNC adaptor, £200. Both immac with manuals. C410F, tel: 01-722 7040.

ICOM IC751E, mic, ICPS20 psu/spkr, RC10 freq controller, FL70 wide filter, EX310 velco synth, £1195. ICOM 2KL, 500W HF all-band linear plus IC2KLP5 attendant psu, £1200. ICOM ICAT-500 HF auto-atu, all-band 500W, £375. All boxed, immac. C410F, tel: 01-722 7040.

YAESU FT226R c/w 2m/70cm/sat units, mint condx, boxed, manual, £925. BL40X 80m/40m trap-dipole, £20. C410F, tel: 01-722 7040.

EVERYTHING MUST GO - (so will consider offers!) FT-ONE, all options, £1250. Expander board kit, new, £40. FT480 2m multi-mode, £300. FT780 70cm multi-mode, £325. 5C1 psu/console, £50. FT208 2m h/hold, £160. FT708 70cm h/held, £150. MB821 mobile bracket, £5. FN02 new battery, £20. NC8 pau/chgr, £30. YH24 spkr/mic, £12.50. PA3 mobile psu, £10. Palm IV, 7off xtals, chgr, £70. O1011 d/boom scope, £125. CNA1001 auto-atu, £115. Joyboom 70cm 8 over 8, £20. MHL144/30LS 2m linear £60. MHL144/30L 70cm linear, £80. Oregon 32, BAK cartridge RT1Y/CW/AUTOR/MONITOR interface unit, £175. All as new, sets boxed etc, local delivery, collect or send p/p extra at cost. G3BKL, OTHR, tel: 0980-862489, after 6pm.

LT23cm tvtr, new unused, £300. CX5200 relay, new unused, £25. FT290R, new unused with swr/pwr meter £295. FT790R vgc with swr/pwr meter, £295. Rotor KR400, cable, bearing stay, £65. 48-olo multibeam, £70. G6LUZ, tel: Crewe 811373.

TET H834D 4-olo trl-bander beam, 10m/15m/20m, £180 ovno. All-weld tower, floor/wall mounted, 2off box sections, 30' max height, £220 ovno carriage to be agreed with purchaser. Brian, G4RW0 OTHR, tel: 0785 71-4963.

FT1012D, fan, vgc, £325. Suborby built psu, most parts HF linear plus bits OR0 2m linear incl 4CX250B, HF bases, VHF bases, blowers, plans, £60. 100W+ 2m valve linear, blower, remote psu, £50. Dave, G4UKP, tel: 0782-813426, office or 518207, home.

YAESU FT780R, 10W 70cm multi-mode 1CVR, vgc, £430 ono. CP432X 70cm base collar, used indoors only, as new, £20. C4V1C, OTHR Dorking (Surrey), tel: 0306-885533.

FT725RD 2m TCVR multi-mode, hardly used c/w all cables and free 5/8 mobile whip and H89CV antenna, £500 ono. Profor buyer to inspect/collect but carriage can be arranged. C4Q00, M01 OTHR, tel: 0927-858057, weekend only.

ROTATOR T2X, very h/dnty, unused, still in box c/w 50m of rotator cable, £350 ono. G400TJ, tel: 0224-834078, work or 03586-438, home.

ICOM IC70R RX, FM fitted, £400 ono. AVO Mx7 for spares, £10. Mr J P Wright, 12 Norn Hill, Basinstoke, Hants, RG21 2HO.

ICOM IC4E 70cm h/held TCVR c/w case, helical antenna, nicad pack, no chgr, ex condx, £100. Roy, CUBTCP, OTHR, tel: 0481-47918.

FP707 20A psu and L/S for FT707, new condx except for small soldering iron mark on plastic trim hence £105. G4AMX, OTHR, tel: Hanney (Oxon) 498.

2m ANTENNAS: HS-GP23 collinear, £24; Jaybeam GP, £5 H89CV, £5; Halbar QD horiz, £12; Hag mount, £7. All vgc. Dos, G4NEK, OTHR, tel: 0234-852865.

TR10 TS430S 1CVR, FM board fitted plus MC60 desk mic, all as new and boxed, unused by present owner £565. G4YE1, OTHR, tel: 01-286 2975.

TEN-TEC Argonaut 509 1CVR c/w suitable psu, audio filter, manual, xtal calibrator and orig box, 5W SSB/CW, 80m-10m, £210. G4FAH, OTHR, tel: 01-693 9149.

YAESU FT290R TCVR, muTek, nicads, mobile-mount, gnter-mount and antenna, little used, ex condx, £260. Chris, G6IJT, tel: 0327-40080.

FT757GX plus FC757A1 auto-atu, ex condx, perfect wkg order c/w AM600 base/mic with built-in graphic equaliser, £750. G4EJH, Crawley, tel: 0293-541205.

YAESU FT290R, MC15 psu/chgr, MH12A28 spkr/mic, PA3 car adaptor, 78F mobile whip, slim Jlm, 4 months old, selling for £295 saving £105 on new price, orig boxes and instructions. Dave, G4RSR, OTHR, tel: 0252-873792.

FT1012D 1CVR, digital, gc, 6-bands, mic, full workshop manual, £425 complete. Prefer collect. Mike, tel: Farnborough S18009, 10am-6pm or G3JJU, Fleet S831, evenings.

SOMMERKAMP FT690R with Spectrum 25W pa and 8N05 filter, £210. Yaesu FT290R with nicads and chgr, £225. Microwave Modules 144/30LS linear, £65. All wkg with receipts. C4VPV, tel: Byfleet 44706, afternoons or evenings.

RADCOMS from Nov'81-Nov'86 (4 missing) for sale by pauper student! Any reasonable offer accepted, buyer collects or will be posted. Basso, Wimbledon tel: 01-540 4493.

FT1012D MK3, FM, CW filter, no mods, mint, £485. SEM Transmatch incl 160m, £65. DNT M40FM and Icom 1050 modified 10FM, £20/£30. Kenpro XR250 rotator, vgc, used indoors, £30. C40GL, OTHR, tel: Chelmsford 400825.

NOISE FACTOR TEST SET c/w HP UHF noise source 349A, £25. Pye Cambridge, £10. Pye Reporter, £10. Unused tri-band HF boom, £120. Regulated psu, -20V+10V @ 0.5A, £10. G6C21, no charts, £10. 7BRP teleprinter, £5. G3BYC, OTHR, tel: Welwyn 6389.

NEW UNUSED Sharp video lens assy. comp unit 6x pwr zoom + macro F1.4 auto focus lens, £30 ono. BBC Nightingale modem + Comstar, used twice, £90 ono. Unused BAY96s, £2.50 ea. C3RNV, OTHR, tel: 061-477 0315, answerphone.

TR10 TR9130 2m multi-mode, 5W/25W, base stn only, little used, Trio TR201A 2m 5W/25W, both c/w fittings, instructions, boxed as new, £400/£230, no offers, buyer collects or pays carriage. G6XRL, tel: 0625-876192.

HAMMARLUND SP600JX-10 communications RX, 0.5-54MHz, 19" front panel for console mounting, ex condx, handbook, best offer over £150, buyer arranges collection. G3LHW, OTHR, tel: 0372-57837, after 8.30pm.

NATIONAL HR0-MX RX, gc but not wkg due to unfinished mods (rf/lf stages untouched), suitable for rebuild c/w all cell units, offers around £40, buyer arranges collection. G3LHW, OTHR, tel: 0372-57837, after 8.30pm.

MINT NAC 144XL, mains powered linear/rf amp with built-in 13.8V dc tcvr psu, fully metered pa/HI current, RF o/p, swr, RF or hard wired switching, variable 'hang' time-constant, provision for alc, drive 1W-10W, o/p very very clean, all functions selectable on front panel, linear/stroight thro', fwd/ref pwr/swr, pro-amp in/aut, c/w new sparo 4CX350 (£80), £325. G3CRH, OTHR Midlands, tel: 05436-6364, after 6pm.

TH3Jnr c/w new balun. AR40 rotator c/w control box Altron all-metal mast, wall mount, wind-up to 30' plus reducer tube, the lot £250. Heathkit scope 10-18U with manuals, £28 ono. Buyer collects. G3BHA, OTHR, tel: Bournemouth 528140.

TEN FM: DNT M40FM, covers 29310-29710kHz, with 25W linear, £40 plus postage. G3DPR, OTHR, tel: Kemble 028577) 514.

TR10 9130 2m multi-mode TCVR, mobile mount, manual orig box, £375. Park Air Electronics airband monitor, 116-136MHz, £100. Tony, G62X1, OTHR Poxford (Glos), tel: 038 670-256.

ICOM IC290E 2m multi-mode, ex condx, boxed c/w all accessories, £300 ono. G4VZF, OTHR Hastings, tel: 0424-754972 or 0424-751753, evenings.

YAESU FT707, matching FC707 atu and FV707DM, £600. 22A psu extra if required, all vgc, will accept TR2500/1R2600 h/held with accessories in p/exch with cash adjustment. No time wasters. Syd, G4EZH, OTHR as G1E2M Bursledon nr Southampton, tel: 042121-4333.

FT101E, hardly used, as new condx c/w YD14B desk/mic and matching spkr, £400 ono. Howard, tel: 0394-460474.

BELCOM LS707 70cm base stn, vgc, 430-440MHz, all-modes incl AM, £200 ono. Vlsr/Access possible. G6LV1, OTHR, tel: 0703-844904.

SUGIYAMA F850 all-band/mode tcvr, £500 ono. Toni Luna, £45 ono. SX200 scanner, £95 ono. 120W linear amp for HF, all-mode, £95 ono. Texas Silent 700 printer, £30 ono. MH432/144R tvtr, £75 ono. G4JOA, OTHR, tel: 0945-65716.

FT290R with nicads, chgr and rubber duck, ex condx unmodified, £230. G3MPX, OTHR, tel: 029 671-4183.

IC02E hand portable, immac, boxed, £190. Level1 RF millivoltmeter, 450MHz, ex, £110. Level1 AF millivoltmeter, £75. Farnell millivoltmeter, £40. Avo 8X with leads, gc, £40. Oymar audio o/p meter, £25. Hanlax slide projector, screen, £45. G6CIV, Ipswich, tel: 0473-311259.

TR10 15120V with 500Hz filter, 1120 linear, manuals, £375. BN05 30A psu, £100. Oatong FL2 audio filter, £65. Daiwa CNA1001 auto atu, £65. Complete station, £575. Tony, G3FZC, OTHR, tel: 0925-522403.

YAESU FT209RH 2m 5W h/held, 144-148MHz, 6 months old, £199. Yarn 757A1 auto atu, 2 months old, not used for 1X, swl only, sell the best offer. Global 1000 atu for swl, £29. Lancaster, tel: 01-845-4008.

JVC GRC-1 VIDEOMOVIE, complete system plus AA-PIEX pwr adaptor, MB-PSU battery, carrying case, all mint condx, £725. Oumpleton, tel: St Albans 53220.

CENTURY DATA hard disk drive unit, 20MB, gwo c/w spare boards, £100. WANTED: Yarn Y0-901 multiscope for FT-9020H. G0OLF, tel: 0604-770835.

CWBUK SILENT KEY SALE: Yaesu FR50B RX. Amateur bands RX. Electronics front-end, G20AF TX. Elizabethan AM/CW 1X. 2m FM 150W TX. Common psu for the three TXs. Buyer inspects/collects. Any reasonable offers to G3RVF, OTHR, tel: 0222-628166.

ELECTRONIC KEYS, Ketsum EK150, built-in lmbic paddle and psu, vgc, £70. MK707 stroight key, £6. G4MHC, OTHR, tel: 01-878 5303.

YAESU FV901DM synthesised scanning vfo, £100. Microwave Modules RTTY/ASCII 1CVR MH4000 with keyboard, has wide range of RTTY/ASCII speeds, £150. C4HTE, OTHR Potters Bar, tel: 0707-54905.

TR10 2200CX, nicads, chgr, caso, full 2W o/p, 12ch, £85. SMC 2m 7/8-whip c/w guttor-mount, boxed unused, £200. Timostep LHA144 pre-amp, £12. Brass key (Kent), weighted hardwood base, £18. Postage extra. G4YZX, OTHR, tel: 0304-375136.

MHL432/50 plus pro-amp, £115 ono. SEM 10x 2m linear plus pre-amp and psu, £110 ono. 1ho pair £200 or exch valve 2m linear. C110J, OTHR, tel: Epsom 42476.

TS780 DUAL-BANDER multi-mode, excellent base stn, 2m/70cm 1f-shift, 10W, mic, vox, recently aligned, boxed, £500. MC60 desk/mic, £30. FT708R 70cm h/held, spkr/mic, 2off xtals, chgr, boxed, £150. Mulok 1VVF50C tvtr 2m-6m, boxed, £150. Yvos, C4U01, OTHR, tel: 01-200 1839.

FT212R front-end board PB-1456B, £5. Yaesu YH-47 mic, £6. Coslo HR10 printer/calc, £5. FT290/790 carry-strap, £2. SEM Sentinel HF cvtr, £15. RSGB Morseman, £15. NSF cvtr module 45-105MHz and 105-220MHz, £5 plus instructions. G8ESK, OTHR, tel: 0274-497438.

METER ex Avo 1001, £3. AF storoo amp + pre-amp TQ42006, BD148/BD149 info, £5. MW/LW aa + FM module and capacitor, ox Murphy portable, £3. 8-section tele oerlot, 6"-33", £2. Multimeter Supporter 680R by ICE Italy, £12. G8ESK, OTHR, tel: 0274-497438.

M0680551P, £3. LH2904H, £1. ex equip. Perdio portable RX, MW/LW, gc, £5. Smiths 'Sectric' clock 240V, vgc for age, suit shack wall, 12" dia, £12 collectable item. Z1X653 NPN gon/purpose, high current, 6 for £2. G8ESK, OTHR, tel: 0274-497438.

YAESU FT221 2m base c/w YC221, SP221, manual & mic £350. Orae AA psu, £20. Pye int broadcast-band RX model 3042, £30. Rechargeable soldering iron and chgr, £20. G1CLJ, OTHR Wills, tel: 0793-874614.

W10E-SPACED hi-pwr HF variable capacitors, £17.50. Storno 2m pa strip, 25W 24V (12W 12V), new unused, £15. Philips video VR2020 complete, good heads, needs attn, £25. Nixie boards with HV transistors, £1 ea. Paul, tel: 0843-61448.

YAESU FT212R, perfect condx, no mods, prefer buyer collects, £250. SMC antenna GP144E, £15 perfect items plus carriage. WANTED: Urgent, manual buy borrow or photostat for Alrmec 858 osc, your price. G3ESB, OTHR, tel: 0332-671536.

TR10 TW4000A 2m/70cm TCVR, 5W/25W, vgc c/w boom/mic and pre-amp, £325. Daiwa 670A swr/pwr meter, 0.5-150MHz, twin-needle, £25. G6PJP, OTHR, tel: 0602-877737.

100 METRES twin-axial 100 ohm cable, brand new, cost £72.45, bargain £18. Also Alnico linear amp, 1-3W 1/p, 30W o/p with pre-amp, brand new, unwanted gift, bargain at £46. Mike, G6MNX, OTHR, tel: 0904-422773.

SIGNAL RS375 airband RX, case, helical, vgc, £60. 3-bed det OTH, large gdn, shack, all mod cons, North Suffolk village, £45k ono. Lockwood, G3XLL, OTHR, tel: Mel11s 596.

YAESU FT226R 2m/70cm/sat complete, boxed, £875. Dressler D200 2m linear, 4CX250B, 300W, £550. Dressler D70 70cm linear 300W, £550. Carriage extra. Clarke, Guildford 275641.

FTDX401 YAESU 1CVR, one owner, manual, works all bands, could be seen, offers with SAE. C70FC, Q1HR

FLOX500 vgc, £100. OP1070000, 600MHz Iraq counter, boxed, es new, compact, int nleads + chgr, excellent manual, £100. 1A appch-processor, ES. Large psu, wkg but suitable breaking. Various L1-H1 o/pa incl 1500V @ 300mA Admiralty t/former, £10. C4CML, Q1HR, tel: Cravoeand 63037.

AYO B Mk5, mint, £68. Katsuni EK-127, £32. Admiralty key, brass/silver, £60. Mains psu, BC221 £2. Oscillators, O-SR, £2 ea. WANTED: HF SSB 1CVR, £120 available. Also cheap RX for new smt, anything serviceable. G4AZC, N01 Q1HR, tel: 1honet 69068 or 294446.

SILVER-REED EX43 printer with RS232 Interace, £90 Robot 400 SSV scan converter, gc, £300. G3VQC, Q1HR, tel: 0905-820374.

SWAN 350 TCVR and matching psu/spkr unit, almost mint, £275. Sphlnx 1X, SSB/CW, 160m/80m/20m, almost mint, sensible offers? WANTED: Francio-Barnett or James m/cycle in gc. G3MCH, tel: 0759-318408, evenings or weekends.

TR7800 TCVR, 25W, 144-146MHz, £160. 145MHz 9-ale crossed Tonna, 1 yr old, £28. Solartron scope, C1436, requires some attn, £12. Stereo amp, £5. Valve USA car radio, ES. Chris McCarthy, tel: Ipswich 689982.

ICOM ICQ2AT (USA version of ICQ2E) 144-146MHz incl base/chgr, largest battery, spkr/mic, 1 yr old with 240/110V cvtr, £225. IC2025 with h/mic and turner base/mic, £125. Both gc. C81JC, N01 Q1HR, tel: 07903-288.

HK-703 MORSE KEY, as new, £15. Melz coax switch CH204, os new, £15. ARRL Antenne Book, £4. Postage extra or collect. G4LVP, Q1HR, tel: Mitchin S8728, altor 6.30pm.

FT9010, FL2100B, both mint condx, limited use only professionally serviced, £500/£300 respectively or £750 together. Cash & carry please. G3CPS, tel: Eastbourne (0323) 643172.

WM2 RADIO CEAR: Radar scanners, 201 APS3; Indicator No88; APS3874 meter; RX type 78; RX type J002; psu type 2801 control panel C17/APS-3; loop antenna for DU-1; range unit AP No5017; offers? or swap WHY? Chris, CARBR, Q1HR, tel: 01-398 8172, evenings.

HICRON TCVR, 80m-10m CW, 8W or 80W, fitted digital readout, int atu, smt meter, professionally built, ex condx, many recent QSOs, £180 one plus carriage G3XUQ, Q1HR, tel: Southampton 774352, evenings.

TOMNA 19-ale crossed Yagis, 201f A320Hz c/w phasing lines end N-type plugs for circular polarisation, gc, 1 yr old, £18 ea. G0AMP, Q1HR, tel: Q482-651827.

UNIDEM CR-2021 portable gen/cov RX, AM/SSB/CW, 150kHz-30MHz, digital tuning, scanning, 6-memories LCD frequency display, 76-1080Hz FM, battery/mains c/w psu, cost £166 sell £80. Datong SRB2 'Woodpecker Blaster' c/w psu, £55. G3EQC, Q1HR, tel: Bolton S1502.

MUSTANG (MOSLEY) beam 2 or 3-ale tri-band, 2kW pep unused, save £85, price £190. Telemast (SMC) 30' in 10' telescopic sections plus rigging kit, unused, save £50, price £55. G43YVC, Q1HR, tel: 0222-755190.

DRAKE 1R5, 150W solid-state TCVR, 160m-10m, digital readout, fitted noise blenker and 300Hz CW filter, matching PS75 psu, MN7 atu/avr bridge, MC-355 mic, £550. C31X0, Q1HR, tel: Northampton 858090, altor 7pm.

PYE EUROPA MFSFH, e-band, unconverted c/w mic and manual, £20. Clartone CH800 6ch h/hold, R1/S21 c/w mic, chgr & manual, £35. Richard, C6TJJ, Q1HR, tel: 01-422 2113, evenings.

TO15U00 IR2100M 2m SSB rig with mulak pre-amp, £100. SEM multilitter, £30. Jaybeam 05/2M, £20. WANTED: HF rig, FT107, FT10120 or similar. Richard C4TJC, tel: Potters Bar S1449, 13th December to 10th January or write Q1HR.

BRAND NEW, still in box, 15A30S with SP430 spkr c/w Dalm CNWA19 atu, reason for sale? - working abroad, £800 ono. FT209RH c/w FNB3, hardly used, £225 ono. Linda, tel: 01-237 4703. *73 de G6HIA and G6Y22.

SILENT KEY SALE! FTDX401 c/w ext vfo & mic, Qsken smt meter, Datong UPC1 up-cvtr, offers? Believed in gmo so buyer inspects/collects. Mrs Roberts, tel: Ilchester (Somerset) 840436.

1R10 R2000 11tted all options, jealously cared for, used as bedside RX only, indistinguishable from new, manual, pkng etc. any trial welcome, £495. AUU, £20. Positively no offers! G0FFH, N01 Q1HR, tel: 0923-26749.

N01 Q1HR, tel: 0923-26749.

MICROWAVE MODULES MTW435, 20W A1V 1X, MMCA35/600 ATV cvtr, Hitachi B&W camera, monitor & aerial, £190 ono, will separate. Trio 3200 70cm xtal controlled tcvr, £70. Creed 444 teleprinter, wkg. £15. G6KMK, Q1HR, tel: 0283-790796.

IC701 160m-10m digital 1CVR with psu, used twice, £400. Trio VF0240 lor TS830 etc, £50. ORP 1CVR lor 20m CW only, £60. 6011 10' fibre-glass poles, 1.5M dia, £10 ea. Stonr, tel: 0691-831111, evenings and weekends.

WANTED.....

STANDARD C8800 instruction manual to photocopy, will refund postage costs, and return within 24 hrs. Telephone Andy on (0234) 711865 altor 6 pm, as not Q1HR.

HF LINEAR, 2011 B135 c/w psu, near wkg condx, cash waiting for correct item. C4NKP, Q1HR, tel: 0638-552295.

SP901 or SP901/P required to complement FT10120. CALUX, Q1HR, tel: Gara Bridge 442, evenings or weekends.

LATE MODEL TRIO 15930, preferably with CW 11lters, or Ten-Tec Corsair with matching psu, good price paid. C3VM, Q1HR, tel: 0937-844510, altor 6pm.

SERVICE MANUAL for Phillips PM3200 scope to purchase, borrow or hire. American J-38 key. G3TSS, Q1HR, tel: 043-471 3125, evenings.

MANUALS lor Stoddart RXs or Inlo; types NM22A, NM30A, NM10A, NM52A, any reasonable price, copying cost, deposit or lender's fees paid. Prompt return of loaned items guaranteed. Pater Burt, 35 Dorking Road, Guildford, GU4 8NW, tel: 0483-572940.

MANUAL or loan for copying for Trio TR2200CX. G3RTJ, Q1HR, tel: 0536-770529.

HW7 1CVR. Would consider Ten-Tec 21 at right price or compact 20m CW 1X. C3JIC, Q1HR, tel: 0744-23916

EDDYSTONE 870A manual or any Inlo. GWIEQC, Q1HR, tel: 0978-355952.

SERVICE MANUAL: Pye W15U Westminster, buy or borrow, your price. G3EQM, Q1HR, tel: St.Austell 882365.

70cm MULTIHOOE: Trio 1R9500 or FT780R or similar, must be in gc, cash waiting for right rig. Dave, G6LKB, Q1HR, tel: 0229-54982, altor 6pm or 0229-23356 axtn 3288, office hours.

ATLAS 180/215/210, any condx wkg or not, even if scrapped for spares, will collect within reasonable distance. Chris, C4HYG, Q1HR, tel: 0204-651348.

OLD NON-WORKING YAESU FT227 lor spares, case only would do. Joe, G6HYZ, Q1HR, tel: 0482-802706.

GENERAL COVERAGE RX, 2-30MHz, gc, digital frequency readout essential, memory preferred, ap PRG7700, R1000, R600 or similar. G3EOP, Q1HR, tel: 0245-380167.

FV200 vfo, silver-gray model preferred. FTV650B, 4m tvtr, Europa or similar. HFJ CW or CW/SSB audio 11lter. C3ICH, Q1HR, tel: 0823-680234.

SERVICE MANUAL or cct diagram of Dymar Electronics 971 LB 12-5 6ch AM 1CVR to buy or borrow. G6IEY, Q1HR, tel: 0272-652116.

GOOD HOME OFFERED to broken or abused TS130S lor rebuild, realistic price please, might consider TS130V. Collection no problem. Kevin, G3ZHC, Q1HR, tel: 058086-533.

MAGNUM 2 or Europa 8 tvtr. Also cct Inlo lor OM70 Buccanear tvtr or will sell some, RX good, 1X low o/p, £20. FOR SALE: Heathkit SW717, £40. Brelm BRL200, needs new valves, £20. All ono. Martin, C4WJX, Q1HR, tel: 0782-330613.

HF TCVR, anything considered for small struggling radio club, will also accept TX/RX combo, must be moderately priced. Details please to G0FBR, Coole R&ES, 14 Clifton Gardens, York, DN14 6AS, tel: 0405-60944.

23cm & 13cm SSB Electronics tvtrs. DX1296S and DX2320S pre-amps plus sooner or later, EME 23cm & 13cm linear amps. Colln, G4ZPJ, Q1HR Southend-on-Sea, tel: 0702-68742.

XIAL CONTROLLED MOBILES lor 2m and 4m, Storno, Pye etc with cct details. Sig/gens for FM stereo and VHF 30-200MHz region. Des Walsh, E1SCD, 17 Owenabue Rise, Carrigaline, Cork, Eire, tel: Cork 371652.

STATESIDE RADIO MAGAZINES or recent years, collection possible 5 Wales, Midlands and SE England. Des Walsh, E1SCD, 17 Owenabue Rise, Carrigaline, Cork, Eire.

F1290R ACCESSORIES: HMB-11 mobile mounting bracket; FL2010 linear; CSC-1A case; Mobile antenna. Howard, tel: 0394-460 474.

EARLY WIRELESS & CRYSTAL SETS: Particularly interested in WWI sets and 1920s items, valves, speakers, bound volumes of 'Wireless World', catalogues etc. Top cash paid. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, tel: 0207-510400.

HF TCVR, any make, must be in gc, price around £300. COOJY, Q1HR, tel: 07255-439, altor 6pm.

HANDBOOK, cct diagram lor AR880, Inlo lor the inclusion of a product detector appraclatrd, all costs reimbursed. Cheap AR880 required, wkg or not. G1PDA, Q1HR, tel: 01-857 1813.

HANDBOOKS lor Yeosu FRDX400 and FLOX400, must Incl cct diag, please state price. C4OLK, Q1HR.

AMERICAN COMPACTORNS: 6C10, 6CB6, 6ES8, 6CM4, 6J11, 6DZ4, also 12AV7 for 101onic sweeper SH/2000 Plug-In RF heads and data on heads please. C4ZHCJ, Q1HR, tel: 0766-770637.

TR10 MC85 and MC425 mics. Howard, tel: 0394-460474

EVERDAY ELECTRONICS magazine, September 1973 required to complete set. G8NWZ, tel: 0933-73611, altor 6pm please.

AVT ELECTRONICS DM091 9" monitor, any colour or any similar metal cased monitor, must be in gc. VIC, C4YLZ, Q1HR, tel: 01-950 5442, evenings.

MANUAL OR CCA lor Ulte 'Cub' 1P487-PM, Oymar S85 al pwr meter, Dynamo 71 scope 1X2 timebase, 1Y2 amp. Schlumberger 4900 r-lal measuring unit. Also internal digital display lor FT1012 to covart to FT10120. CBEVC, Q1HR, tel: 0602-820517.

LOW HILCEGE, ono owner, HF valve separates, la Orakr C-line etc, must be mint, no mods. Also suitable ancillary equipment to match. 2m gear also required. Jack, C4CBA, Q1HR, tel: Barry 741520, or write.

CCT DIACRAM lor a 'Super Scan 240' lcom 240 add-on, your price for a copy or loan. G3CRH, Q1HR, tel: 05436-6364.

TELEQUIPMENT 067 service manual, copy, borrow or buy, expenses refunded, any help much appreciated. Also Heathkit B&W TV CR9900 manual. C4XMK, Q1HR Surrey, tel: 08833-4718.

YAESU FT10120 Mk3 or FT9020M with matching atu, each lor FT707, FP707, FC707, FV7070H plus C-whip mobile antenne with 80m coil plus extender rod. Small cash adjustant either way, will travel to meet hall way. Colln, G0DNO, tel: 051-638 0854.

HUSTLER MOBILE HF ANTENNA c/w 80m-10m coils. G3HRT, Q1HR, tel: 0252-547900.

F177 FM board, narrow CW 11lter end 25kHz marker board, no mods please, your price for good unit. Maybe collect 11 needed. Keith, G0FJD, Canvey Island (Essex), tel: 0268-680638, altor 2pm only.

KN109 SUPER MATCH atu, must be ex condx. Also manual lor R1132A RX. Details & price please to Pete, G3VDU, tel: 0703-343680.

SERVICE MANUAL lor Solartron CD1014.3 oscilloscope to purchase or loan against deposit lor copying and return, full postage paid. G4OCUM, Q1HR, tel: Cambridge 3212, anytime.

FILTERS: Trio type YK8BS, YK8BC, YK8CN. G3RNI, Q1HR, tel: Roydon (Essex) 3155.

FT730R or similar. C1SRJ, Q1HR, tel: 0964-70395.

MOBILE MOUHI lor NDI HC1400 2m FM TCVR, also cct diag, any Inlo on above. Cheap HF or 80m TCVR in wkg order. Batteries lor Storno 500 series 1CVR. J Hewitt, G0CJO, Q1HR Co Durham, tel: 091-410 7884

CW FILTER XF30C to suit Yaesu FT101B. C0BCU, Q1HR, tel: 0942-714527.

TV MONITOR also camera plus lenses etc, wkg or not with drawings, if not possible will purchase separately. Webb, tel: 0909-S64289.

ICOM IC-R71E gen/cov RX. C3RDC, Q1HR, tel: 01-455 8831.

RACAL 1778, 6217, 1217, 1218, RAS EX47, EX56 and ether professional HF and VHF RX/TX. Also solid state test gear from RAS. Short description to Kay Schnidderreit, Frankweg 24, 4630 Bochum 6, tel: 010 49 7327 57853, Saturdays 1-3pm.

DRAKE RV75, cash waiting for mint condx unit. Write: Richard Olamend, 01 BP 7168, Abidjan 01, Ivory Coast, West Africa. Telex: Abidjan 22413 (answerback NCRCO-CL), tel: 010 225 22 69 69. Cost of call reimbursed.

ICOM IC215 h/held, sensible price. Stuart, G6HDC,

NOT OTHER, tel: 0562-751745, evenings or weekends.

HALLICRAFTERS SX100 handbook or manual, ccts, info history. Lrfever, tel: 031-664 2270, evenings.

FT225RD, cash paid for rig in any condx, prefer with mutek and memory unit. Also 144MHz QRD valve linear, home brew considerrd. Mirag HP2 mtrr. Will collect any distancer. GAJBN, OTHER, trl: 0935-23873, evenings.

WESTMINSTER WISFMD, 'E' band for 4m or 6m already convertd. Also Icom 701 or 720, FOR SALE: DX33

tri-bandrr, mint condx, £160. GDDQA, OTHER, tel: 01-856 4123.

YAESU FTV700 tvtr with 2m moduler. Also Yaesu FT209RH h/held. Beth must be mint. Adams, trl: lrvine-217611.

CCT DIACRAM for Drak R7 RX, all expenses rrpaid. RS43503, 33 Chantry Lane, Grimsby, S. Humberside, DN31 2LP, trl: 0472-58896.

CONDITIONS OF ACCEPTANCE

* These subsidised flat-rate advertisements are accepted as a service to members of the RSCB only. They must be submitted on the Members' Ad form printed on the back of a recent address label carrier used to mail RadCom to the advertiser; this will automatically provide proof of membership and should not be more than 2 months old. * No acknowledgement of receipt will be sent and advertisements not clearly worded, or which do not comply with the conditions of acceptance, will be rejected. No correspondence concerning this service will be entered into.

* Trade or business advertisements, even from members, will not be accepted for "Members' Ads"; these should be submitted as "Classified" or "Display" advertisements. * In the usual way, traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSCB reserves the right to refuse advertisements and accepts no responsibility for errors or omissions, or for the quality of goods offered for sale. Advertisements for citizens' band equipment will not be accepted. Refunds will be sent for any advertisement which are rejected for any reason.

WARNING: Members are advised that they should, as far as possible, ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The "purchase" of goods legally owned by a finance company could result in the "purchaser" losing both the goods and the cash paid.

RATES: The current rate for Members' Ads is £2.30 (incl VAT) for 40 words or less. An additional cost of £2.30 is incurred for every additional 40 words or less. Each advertisement must be accompanied by the correct remittance, either as a cheque or

postal order made payable to 'Radio Society of Great Britain'. When writing out advertisements, please ensure that you do not enter more than one word in each 'box' on the form. It is advisable to read some of the advertisements contained on these pages and familiarise yourself with the house style. Equipment type numbers, telephone numbers and certain abbreviations will count as one word. It may be necessary to edit certain advertisements in order for them to comply with the conditions of acceptance.

The following abbreviations are in common use for Members' Ads:-

TX - Transmitter RX - Receiver
TCVR - Transceiver
TVTR - Transverter CVTR - Converter
gen/cov - general coverage
sig/gen - signal generator
vgc - very good condition
gc - good condition
rx - excellent condx - condition
c/w - complete with

Post to: MEMBERS' ADS, RSCB, LAMBDA HOUSE, CRANBORNE ROAD, POTTERS BAR, HERTFORDSHIRE, EN6 3JW.
DO NOT POST TO THE ADVERTISING OFFICER



CAMBRIDGE QRP COMPONENTS

JOHN G4KJJ QRP No. 927

Prices include V.A.T. please add 35p Post/Packing to all orders under £10. Cheques to Cambridge Q.R.P. Components

CARBON FILM RESISTORS 5% Tolerance 1W 15R to 1M5 1p Resistor Selectpak 60 values (10 ohm 600 Total £5.45, (Saving 10%).

POLYSTYRENE CAPACITORS 63v WK Radial 56 68 100 pF 5p 150 180 220 270 330 pF 7p. 390 560 680 820 1000 pF 8p.

GENERAL PURPOSE CERAMIC 50v WK Ver. Mounting 1 4.7 10 47 100nF 4p.

POLYESTER RADIAL 100v max 22nF 9p 220 330 10p 470nF 13p. High Quality Multi Layer Ceramic 10 100nF 11p. Capacitor selectpak 45 values as above (5 ohm 120 total £7.99 (Saving 10%).

ELECTROLYTICS Radial (MFdsivolis) 1/63 6p. 10/25 8p. 47/25 9p. 2.2/53 6p. 22/25 8p. 100/25 8p. 4.7/25 7p. 33/25 6p. 220/16 10p. Electrolytic selectpak 9 values as above (5 ohm) 45 total £3.20 (Saving 10%).

TRIM CAPACITORS 2-20pF 3-60pF 28p.

ZENERS 400mW 5.6v 8.2v 9.1v 16v 24v 8p.

TRANSISTORS, I.C.s Diodes, LED BC107/89 13p. BFY50/51/52 25p. 2N3053 38p. LM741 38p. BC149 13p. 2N3904/6 25p. 2N2222 38p. BSX19 38p. REO LEO/AA1 18 10p. 2N2905 25p. 2N3819 38p. BSX20 38p.

VOLT REG 7812 48p. BD131 555 BB105 BA102 48p. 40673 £1.30. LM380 £1.30.

RF CHOKES 47 220 uH 35p. 330 1000 uH 38p.

TOROIDS T68-2 42p. T50-2 38p.

COIL FORMERS with core 7mm 0.15p.

POTENTIOMETERS 5KLG 10KG 1KLN 5KLN 10KLN 50KLN 52p.

SWITCHES 250v 1A miniature S.P.S.T., S.P.D.T., O.P.Q.T. 99p. Waler switch 250v 2p-6W 4p-3W 1p-12W 80p.

PHONO PLUG Red/Black 22p. Phono Soc. Red/Black 22p. JACK Plug 3 5mm0 28p. Jack Socket 25p.

Connecting wire 10 colours 99p. Flux Cored Solder approx. 1oz 22swg 99p.

Enamelled copper wire 24, 26, 28, 30, 32, 34 SWG All 6 sizes inc 1oz bank for 99p.

I can supply components for most popular Q.R.P. projects FOXX OXO JUE SWR BRIDGE, ATU etc. Write with s.a.e. for list or send £1.65 for C.O.C. Component Guide to Cambridge Q.R.P. Components, 30 Rookery Close, St. Ives, Huntingdon, Cambridgeshire, PE17 4FX

Tel: (0480) 68330

AMATEUR RADIO SOFTWARE NEW RELEASE FOR VIC 20

RTTY

Type ahead, Standard Baud rates..... Tx/Rx £8:50
Rx only £7:00

S.A.E. for details of ready built interface

RTTY

SPECTRUM (48K, PLUS & 128)
OSO Review, Printer dump, type ahead..... Tx/Rx £8:50

C.W.

Memories, Etc. (Both require filter)..... Rx only £6:00

SLOW SCAN T.V.

Self tracking 8/30 wpm, type ahead..... Tx/Rx £8:50

FILTERS

Memories Etc..... Rx only £6:00

TERMINAL UNITS

Save to Printer, Brightness, Contrast and inverse controls, Etc..... £7:00

DRAGON.....

RTTY only, £6:00. C.W. only, £7:00. (Both unboxed)

ATARI 400/500/800 & XL

RTTY/C.W. switchable (boxed)..... £11:50

Send S.A.E. for full details & Spec.....

with Timing L.E.O..... £13:50

NO SPACE FOR FULL DESCRIPTION

£45:00

MORSE READER PROGRAMMES for:-

Send S.A.E. for full details & Spec.....

ORAGON.....

VIC 20..... CBM 64..... BBC 8..... ZX 81..... AMSTRAD 464

ATARI 400/500/800 & XL

Self tracking 8/30 wpm, off air or practice

Needs small interface (except ZX81) circuit inc.....

£6:00

Ready built interface to suit.....

£2:50

S.A.E. for full details of all our products

J.&P. ELECTRONICS LTD

New Road Complex, New Road, Kidderminster, DY10 1AL

Tel: (0562) 753893

WATERS & STANTON TRIO

APPROVED
DEALER FOR
ESSEX &
THE SOUTH

ELECTRONICS

AVAILABLE AGAIN! OUR COMPLETE
MAIL ORDER PRICE LIST. Send S.A.E.

WELZ RF MEASURING PRODUCTS NOW WIDELY USED THROUGHOUT INDUSTRY



SP220
1.8-200MHz Power/VSWR
0.2W/20W/200W average
power or PEP. VSWR sensitiv-
ity 1W F.S.D.
£67.95 p&p £2.00



SP420
140-525MHz Power/VSWR
0.4W/20W/200W Average
power or PEP. VSWR sensitiv-
ity 4W F.S.D.
£74.95 p&p £2.00



CH20A "professional" coax switch
DC-900MHz VSWR 1.1(500MHz)
1.15(900MHz) Isolation 70dB(200MHz)
50dB(900MHz) Power rating 1kW
£29.95 "N" version rated 1300MHz
£49.00

WELZ DIAMOND D130 DISCONE 25-1300MHz

The new D130 from Diamond offers complete coverage from 25-1300MHz. No other antenna can offer this value for money! And an added bonus is that it can be used for transmit on all amateur bands between 50 and 1300MHz. You cannot use 50MHz vertical polarization in the UK! Constructed of stainless steel and alloy, it comes complete with mast clamps and 50ft of coaxial cable

£77.95 p&p £3.00

NEW

FABULOUS SONY AIR-7

108-136MHz; 144-174MHz; 76-108MHz; + LW/MW/SW



The new Sony Air-7 is a superb new monitor with a performance and presentation that outperforms the competition. The PLL circuitry, LCD readout and 40 memories (10 on each band) make a most versatile package. Such features as priority channel, channel lockout, and delay are all included and the sensitivity puts most of the competition to shame! It also includes the broadcast bands both VHF and LW/MW and covers such things as NOB beacons as well as part of the marine band to 2194MHz. We are impressed and so will you be when you try it!

£249



SONY 2001D

150kHz-30MHz
76-108MHz
108-136MHz
32 memories
AM/SSB/FM BROADCAST

£329

New from Sony is the 2001D general coverage portable receiver. It gives superb performance on the short wave bands using PLL circuitry and has separate filters for SSB and AM. A novel system of synchronous excited-carrier provides a dramatic reduction in interference when receiving AM broadcast stations. Features include LCD readout, clock, scanning, timer, RF gain control, comprehensive memories and a host of features that make it an incredible performer. It equals or better many base station receivers we sell and the SSB performance with switchable upper and lower sideband is a joy to use.

BOOKS YOU SHOULD HAVE!

UK LISTENERS CONFIDENTIAL FREQUENCY LIST
NEW THIRD EDITION £5.95 + 75p p&p

Now completely updated with over 50% more information and a smart new presentation. No self respecting listener should be without a copy. If you enjoy exploring the short wave bands then this new third edition is just the job! It covers the HF spectrum from 2 to 30MHz and gives comprehensive details of transmissions outside the amateur bands. Specially compiled for the UK and European listener it sets out in a very easy way a complete list of hundreds of interesting transmissions that will keep you occupied for days on end! A fraction of the cost of other similar publications, it contains details of Marine, Air, Military, Embassy, Press and News agencies. Many listings have time schedules included with comprehensive RTTY details. It lists the HF frequencies used by civil and military aircraft, when and where to pick up the press bulletins, long distance marine traffic, plus broadcast etc and much more. Send today for your copy of this invaluable publication.

NEW

THE COMPLETE GUIDE TO VHF/UHF
FREQUENCIES 25 TO 2000 MHz

Replacing our previous scanners guide, this new book sets out to cover the complete spectrum between 25 and 2000MHz. It thus keeps pace with the extended coverage of some of the latest receivers. And what's more there are no gaps! If you have any interest at all in this part of the radio spectrum then you cannot afford to be without a copy of this new publication. Beautifully set out in large easy to read pages it starts off with a few hints and tips on receivers and then it goes straight into the heart of the matter; what services operate where! Full details of duplex frequencies are given and there are very comprehensive details of military and civil air bands plus a very comprehensive section giving you all the details you will ever need for marine band monitoring including full listings of all the shore stations. Other entries include sections on police allocations, ambulances, fire etc, and such fascinating entries as NASA and Russian Space frequencies, weather satellites, navigation beacons and much more. So don't waste money on those expensive American publications listing frequencies not applicable to the UK. Send today for this brand new book which will answer all the questions you have ever wanted to know about the mysteries of the VHF/UHF spectrum.

£4.95 + 60p p&p

WORLD RADIO TELETYPE HF FREQUENCY LIST £3.95 + 40p p&p

A new publication produced by popular request. If you are interested in RTTY or thinking of taking it up, this book will be a very handy frequency guide. It lists full details of the World's RTTY services including meteorological, press and marine. They are all entered in country order plus a separate listing under transmission times (GMT). Simplex and duplex frequencies are listed with details of languages but also a handy reference section on band plans and prefixes etc. Altogether a handy guide to have around the shack at just for interesting reading.

WELZ	FDK	TRID
SP825 HF; 6m; 2m; 70cm; 23cm £189.00	M750XX 2m all-mode £489.00	TS940 HF tcvt. £1895.00
SP10X Budget HF/VHF £42.95	M725X 2m FM mobile £329.00	AT940 Int A1U £229.00
SP220 PEP HF/VHF £69.95	ATG720 Airband rx £189.00	TS HF 4305 tcvt. £887.00
SP225 Dual meter £127.95	RX40 140-180MHz £159.00	PS403 PSU tot above £151.00
SP420 PEP VHF/UHF £82.00	ADD-INS	A1250 Auto A1U £342.00
SP425 Dual meter £129.00	AW3030 Base mic. £53.00	AT230 HF A1U £185.00
AC38 ATU 10-80m £85.00	AMS03 Base mic. £89.00	TS8305 HF 240v tcvt. £981.00
CH20A Coax switch £30.75	AP1 Amp for 100M £12.95	TS5305 HF 240v tcvt. £849.00
RS485 4 amp PSU £55.00	FX-1 Goose neck mount £49.00	TL922 linear £1350.00
RS655 6 amp PSU £99.95	MISC.	MCS--All stocked
RS1150 11 amp PSU £159.00	Rubber map mount £19.50	1S780 2m/70cm tcvt. £998.00
RS3050 25 amp PSU £199.00	A11000 SWL A1U £69.00	1R751E 2m all mode £588.00
DIAMOND	HP4A High pass filter £7.95	1H21E 2m h'h'd £199.00
CP4 4 band vert. £149.00	HK708 Morse key £21.95	TH41E 70cm h'h'd £248.00
CP5 5 band vert. £169.00	BL40X 1:1 HF Balun £19.50	TR2600 2m h'h'd £328.00
EL40 40m whip £57.00	Ferrite rings £0.60	TM201A 2m 1m mobile £322.00
EL80 80m whip £65.00	Datong Morse 1urlol £27.95	TM401A 70cm 1m mobile £392.00
M285 5/8th 2m £14.25	Mutek Pre-amps £58.35	TM121F 2m 1m tcvt. £444.00
M287 7/8th 2m £25.95	Revcone Discone (RX) £29.00	TS711E 2m base £839.00
GL5 Gutter mount £14.95	COE AR40 Rotator £115.00	R800 Receiver £323.75
OT30 Discone 25-1300MHz £75.00	KR400 Rotator £148.00	R2000 Receiver £585.00
RH2008 3db 2m BUC £28.50	KC038 Mast clamps £13.80	VC10 VHF module £151.00
EL770 Dual band £26.50	KS065 Bearing £26.45	
	KR500 Elevator £139.95	
	AR250 Rotator VHF £69.00	

NEW

AZDEN PCS5000
2m FM 25w
140-150MHz
(Tx 144-146MHz)

SUPER LOW PRICE!



£299

At last an FM transceiver with an up to the minute specification with an old fashioned price! Highly compact measuring 50 x 140 x 182mm, its 25 watts and high performance front end give superb coverage under mobile or fixed operation. The back lighted LCD readout and key-pad makes for easy operation and the computer controlled frequency selection is a joy to use. Two banks of 10 memories are scanned, consecutively or separately with channel lockout on any or all memories. Priority channel can be used to check your favourite frequency whilst monitoring any other channel and the priority channel can be instantly recalled via a side button on the mic.



MAIL ORDER &
MAIN SHOWROOM:
BRANCH:

18-20 MAIN ROAD, HOCKLEY, ESSEX. Tel: Southend (0702) 206835 & 204965
12 NORTH STREET, HORNCHURCH, ESSEX. Tel: Hornchurch (04024) 44765
HOURS: MON-SAT 9.00 am-5.30 pm. E.C. WED 1.00 pm





Brenda
GAVX

A.R.E. Communications Ltd.

38 BRIDGE STREET,
EARLESTOWN,
NEWTON-LE-WILLOWS,
MERSEYSIDE WA12 9BA.

TEL: 09252-29881



Bernie
G4AOG

FIRST AGAIN WITH THE NEW MODELS

At our Earlestown shop we have the most comprehensive stock of amateur radio equipment to be found under one roof in the whole of the country. We offer full ranges of YAESU, ICOM and TRIO-KENWOOD plus many other makes. But most of all we offer the facilities to try and test one rig against another to make sure that the equipment you decide to buy is right for you. Of course, we also have a large range of second-hand, all with

guarantees. So phone us for the best possible prices. Or pay us a visit—Whether your journey is far or near—A cup of Brenda's coffee is always waiting for you.

Earlestown is just a couple of miles west of junctions 22 or 23 on the M6, and is now open 6 days per week from 10am to 5pm.



QUARTZ CRYSTALS

QuartzLab MARKETING LTD

P.O. Box 19 Erith Kent DA8 1LH

Telephone: 01-318 4419

24Hr Ansafone:

Dartford (0322) 330830

Telex: 8813271 GECOMS—G

(Attention QUARTSLAB)

ALL PRICES ARE EX VAT PLEASE ADD 15%
An SAE with all enquiries please

STOCK CRYSTALS

CRYSTALS FOR 2 METRES

HC25 £2.15 FOR ONT CRYSTAL £1.96 EACH FOR 6 OR MORE

TX CRYSTALS
12MHz 30 & 40pF
18MHz 25 & 20pF

RX CRYSTALS
44MHz Series Res
14/15MHz 20 & 30pF
Scanner Crystals
SR5 crystals £3.00

RO R7, S8-S23,
& S32

HC6 £2.15 FOR ONT CRYSTAL £2.05 EACH FOR 2 OR MORE

TX CRYSTALS
4 & 8MHz 30pF

RX CRYSTALS
44MHz Series Res

RO R7, S11, S20 23

4 MITA1 CRYSTALS FOR 70.25 IN HC6/U AT £2.40 each

1X 11 78250 RX 29 78000

70CM CRYSTALS £3.00 (pi) or £2.50 each

For Pwr P1 P12 & P170 series Wood & Douglas and TOK MULTI U11

SUB (M3) 21 SU20 R60 R82 R84 R85 R86 R87 R88 R89 R90 R91 R92 R93 R94 R95

ALSO for MULTI U11 ONLY SU10 SU11

CONVERTER CRYSTALS IN HC18/U AT £2.05 each

22 000 33 666 47 000 58 000 101 000 101 500 105 666 116 000

FREQUENCY STANDARDS £2.75 each

HC5/U 1000kHz 3.50MHz 5.00MHz 10.00MHz 10.700MHz

HC18/U 1000kHz 7.00MHz 10.70MHz 48.00MHz 100.00MHz

TONBURST. 11. & MPU CRYSTALS IN HC18 £2.25 each

7.18MHz (for 1750 Hz Tone) 10.245 (for 10.7 kHz)

3.2750 4.000 5.0658 10.2400 14.2100 15.0000

YAESU CRYSTALS for FT107A FT901 & etc £4.00 each

Many available in stock. A set is available on request please send SAE

Full list available on request, please send SAE

MADE TO ORDER CRYSTALS

FUNDAMENTALS	PRICE	OVERTONES	PRICE
1st FREQUENCY RANGE		FREQUENCY RANGE	
5 TO 50kHz	£21.00	3rd OVT 21.00 TO 65.00MHz	£4.55
50 TO 150kHz	£11.00	5th OVT 60.00 TO 110.00MHz	£5.70
150 TO 500kHz	£7.00	5th OVT 110.00 TO 125.00MHz	£7.40
500 TO 999kHz	£11.90	7th OVT 125.00 TO 175.00MHz	£10.00
1 TO 1.5MHz	£10.75		
1.5 TO 2.0 MHz	£5.10		
2.0 TO 6.0MHz	£4.75	2.0 TO 175.00MHz 2 to 3 weeks	
6 TO 21MHz	£4.55	5 TO 999 kHz 6 to 8 weeks	
21 TO 25MHz	£8.50	1 TO 1.499MHz 3 to 4 weeks	

Unless otherwise requested fundamentals will be supplied for 30pF load capacitance and overtones for series resonant operation

HOLDERS:—PLEASE SPECIFY WHEN ORDERING—also HC25/U supplied for XTLS above 3MHz

HC13/U & 200kHz HC8/U & HC32/U 170kHz 175MHz HC18/U & HC25/U

2.175MHz

DISCOUNTS: Price on application for 10+ units to same frequency/type, or bulk

purchases of mixed frequencies. We supply FREE crystals for use in UK repeaters.

COMMERCIAL CRYSTALS available on fast delivery and at competitive prices

Please send for list of other interests

EMERGENCY SERVICE for XTALS 1 to 125kHz. Add the surcharge for each

XTAL. Days refer to working days. 4 days + 112, 0 days + £7, 8 days + 15, 13 days

+ £3

CRYSTALS SOCKETTS HC25/20 & HC6/25 are MINIMUM ORDER CHARGE

11.50 unless ordered with crystals

TERMS: Cash with order post inc. to UK & Ireland. Cheques & PO's to QSL LTD

HEATHERLITE PRODUCTS

2M EXPLORER AMPLIFIER

A precision high power amplifier, hand built for 144MHz-146MHz. 350 watts PEP RF output. Tuned anode strip line. In-built power supply. Choice of valves.
£485 inc VAT with 4CX250B
£525 inc VAT with 4CX350A



11F EXPLORER AMPLIFIER

A precision high power amplifier, hand built for the 11F bands 3.5-30.0 MHz. RF output up to 1000 watts. In-built power supply.
£850 inc VAT with 2x4-400 triodes
£950 inc VAT with 2x3-500 triodes

MOBILE MICROPHONES

Complete with control box, mic gain control, PTT, LED on TX. TYPE A suits the majority of rigs
with plug, with scan buttons... 25.00
with plug, with scan buttons... 23.00
TYPE B with second stage amp (for same Icom rigs)... 23.00
FOR SINGLE EARPHONE ON ANY OF ABOVE... add 2.00
TYPE SW for hand portables using jack plus connections, mic. with switching box, earphone, jack plugs 14.50



MIC. and COAX only...mic, coax, circuit... 7.00
mic, coax, circuit, earphone... 9.50
POST AND PACKING on mics. 1.50

HEATHERLITE PRODUCTS,
75 St. Catherine's Drive, Leconfield,
North Humberside HU17 7NY.
Telephone (0401) 50921.



REG WARD & CO LTD AXMINSTER, DEVON



South West's largest Amateur Radio dealer

Official agent for YAESU, TRIO, ICOM FDK

- Complete range stocked
- Full demonstration facilities
- Mail/telephone orders
- Access/Instant credit/Barclaycard
- Wood & Douglas Kits

Ancillary Equipment by: AKD, AOR, Adonis, Bencher, BNOS, CapCo, Datong, Daiwa, Drae, Hansen, Himound, JLL, Kenpro, Microwave Modules, muTek, SEM, Shure, Tokyo Hypower, Tono, Toyo, Welz, Wood & Douglas.

Aerials by: G-Whip, Hygain, Jaybeam, MET, Mini Products, Revco, TET, Tonne.



Reg
G2BSW

1 Western Parade, Axminster,
Devon EX13 5NY. Tel: (0297) 34918

Today
36LUJ



Open Tues-Sat 9.00-5.30. Closed Mon.

JAYCEE ELECTRONIC JOHN GM30PW

20 Woodside Way, Glenrothes, Fife KY7 5DF

Phone 0592 756962

Open 5 days—Tues-Sat 9am-5pm

Out of Hours Service (0333) 29232

Quality secondhand equipment in stock
FULL RANGE of TRIO and YAESU goodies.

Jaybeam—Microwave Modules—L.A.R.

RSGB books—Daiwa—Welz—TET—BNOS

Agent—D. GREY (G8TFL), 7 CEMETERY LOANING,

BERWICK-ON-TWEED. Tel. (0289) 307116



APPROVED
TRIO
DEALER

STEPHENS-JAMES LIMITED

47 Warrington Road, Leigh WN7 3AE (0942) 676790



TRIO TS930S
HF Transceiver

TS830S	£881.00	PS430	£151.48	AT930	£192.75	TR2600E	£328.00
AT230	£185.98	TL922	£1350.00	AT250	£342.38	TS530SP	£899.82
SP230	£56.00	R2000	£565.32	TS780	£998.00	TR751E	£580.70
VF0230	£318.37	H55	£32.00	TM201A	£322.68	TS430S	£867.68
TS430S	£867.68	TS711E	£339.96	TM401A	£392.82	TS930S	£1595.00
TR21E	£199.00	SW100	£46.81	VC10	£151.48	TS811E	£998.00
TR751E	£580.70	SW200	£98.50	TH41E	£240.79	TS940S	£1895.00
SW100A	£46.81	SWT1	£35.72	TR3600	£353.48	MC50	£43.10
TS440S	£998.00					MC60A	£77.60

FULL RANGE OF TRIO ACCESSORIES STOCKED



TRIO R2000
General Coverage Receiver

The only official stockist of Trio equipment in the North West

STATION ACCESSORIES (line post)

SWR50 Twin SWR meter	£24.60
Heavy Duty magnetic mount	£22.90
Pair high power antenna traps	£17.25
Heavy Duty dipole centrepiece	£3.95
LF30A Low Pass Filter	£32.00
VHF Wavemeter	£27.75
WELZ SP5M swr/power	£41.00
WELZ SP350 swr/power	£79.00
NS660P 1-8 to 150M SWR/PEP	£99.50
CN419 Antenna Innoi	£206.37
CN410M 3-5-150MHz swr	£54.00
CN460M 140-500MHz swr	£58.00
HP4A High Pass Filter	£7.50
AT100 SWL ATU	£59.50
HK808 Morse key	£20.15
Lightweight Antenna Rotator	£42.00
MK704 Twin Paddle	£16.57
Daiva 30 Amp Power Supply	£200.00
Pair 7, 1MHz Antenna Traps	£10.50
HS509 1:1 Balun	£23.00
Mag Mount—SD239	£15.50
Gniter mount load	£12.00
Daiva 12 Amp Power Supply	£92.00
Full size G5RV antenna	£17.50
Half size G5RV antenna	£16.25
80-10 Trap Dipole Kit	£26.50

Stockist for Jaybeam, Tonna, Datong, Yaesu, G-Whips, Mic Modems, Balcom, Daiva, Kenpro, AKO, TET, JRC, Pacom.

Full range of aluminium tubing, lashing kits, clamps for the cable

AR2002 SCANNING RECEIVER

Updated version of the best selling scanning receiver the AR2001. Frequency range 25 to 550MHz plus new band 800 to 1300MHz. Improved keyboard. Front panel knob for frequency stepping. LED "S" Meter. Socket for RS232 interface unit. Specifications as the AR2001. PRICE £487.30



TS430S HF Transceiver

ANTENNAS

Jaybeam VR3 Vertical	£56.78
Jaybeam TB1 Dipole	£83.38
Jaybeam TB2 Tribander	£155.25
Jaybeam TB3 Tribander	£238.00
Mini Products HQ-1 Minibeam	£199.00
Jaybeam CS/2M Co-linear	£86.00
DCP5 10-80m Vertical	£149.00
GPV-5 2m Co-linear	£47.36
GPV-7 70cm Co-linear	£37.60

Revcone—Osccone antennas and other scanning receiver antennas in stock
Our secondhand stock is one of the largest in the North. Updated daily. Send SAE.

FULL RANGE OF PUBLICATIONS IN STOCK RSGB, ARRL, ETC.

THREE NEW MODELS FROM TRIO

TR 751E 2M Multimode—25 Watts or 5 Watt Output Smaller and lighter than the TR9130

TR-2550E 2M FM 45 Watt Transceiver—23 Memory Channels
TS-440S HF Transceiver—INPUT 250 Watts · SSB-CW-FM 100 Watts FM · Two VFO's · 100 Memory Channels. Optional AT440 ATU can be fitted internally heavy duty PS50 Power Supply.
J.R.C. NR0525 General Coverage Receiver now in stock at £1195.00

TM 211E/411E FM VHF/UHF mobile transceivers

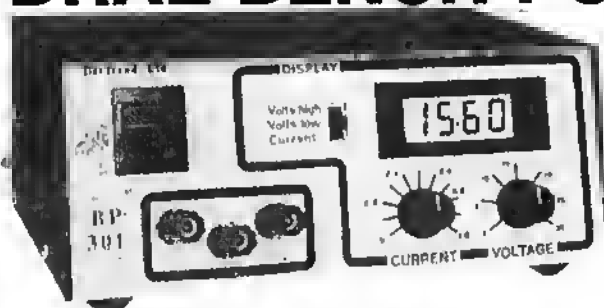
By taking the popular TM201A and TM401A and adding DCS and a tiltable front panel, TRIO have produced higher specification transceivers. Even easier to fit in tight locations, the TM211E and TM411E are transceivers designed to cope with today's crowded bands.

TM211E . . . £444.60 inc VAT

TM411E . . . £498.00 inc VAT



DRAE BENCH POWER SUPPLIES



**SUPERB VALUE FOR MONEY ON
ALL DRAE PRODUCTS**

OTHER DRAE PRODUCTS:

VHF WAVEMETER.....	£27.50
3 WAY VHF SWITCH SO239.....	£15.40
3 WAY UHF SWITCH N Type.....	£19.90
2 METER PRE SET ATU.....	£14.50

SLOW SCAN TELEVISION:

RX ONLY.....	£195.00
TRANSCEIVER.....	£320.00

ALL PRICES INCLUDE VAT

DAVTREND LTD. Sanderson Centre, Lees Lane,
Gosport, Hampshire PO12 3UL Phone 0705 520141

DID YOU KNOW THAT AS WELL AS
OUR RANGE OF LINEAR PSU'S WE
ALSO PRODUCE TWO EXCELLENT
VARIABLE VOLTAGE BENCH PSU'S?

BP 301 0 to 30 volts continuously variable at 20mA to
1 amp. £89.34

BP 302 0 to 30 volts continuously variable at 40mA to
2 amp. £114.11

BUT PLEASE DON'T FORGET OUR
RANGE OF LINEAR PSU'S



24 A @ 13.8v	£125.00
12 A @ 13.8v	£86.50
6 A @ 13.8v	£65.00
4 A @ 13.8v	£43.90

BRITISH
MADE



DRAE

THE NEW TX-3

RTTY/CW/ASCII TRANSCIVE PROGRAM

RTTY has selectable auto CR/LF with user-defined line length, LTRS/FIGS force and selectable Unshift-on-Space.

ASCII has data bits/stop bits/parity/text or binary mode options.

Both have selectable baud rates and shifts, high or low tones, frequency scale for really easy, accurate tuning and keyboard fine-tune.

CW has selectable software filters and TX tone, autotrack fully controllable to 250 wpm or can be locked, auto or fixed speed sending.

All modes have:

Receive screen unwrap—no more split words.

Displayed real-time clock can be transmitted or inserted into review store.

Large review store with fully selectable readout to screen or printer.

24 large memories for your standard information.

Pre-programmed RYRY and QBF test messages.

Callsign capture.

Character or word mode sending from type-ahead buffer or keyboard direct.

Re-transmittable receive buffer.

CW ident.

Memories and review store transferable to/from tape or disc.

TX buffer can be loaded from tape or disc to send a pre-prepared file.

Savable status file contains your current settings for each mode so that the program automatically starts each mode the way you want it.

Ability to use either a T.U. or a simple interface.

All this and more available for BBC-B and CBM64. Other versions coming soon.

To go with it we have the **NEW TIF1 INTERFACE**, especially designed to reduce computer noise. Receive has RTTY and CW 2-stage filters, transmit has outputs for MIC, PTT and key.

TX-3 and TIF1 are compatible with our existing products.

Program on tape £20, disc £22 (BBC: state 40/80 track). If you already have our RTTY/CW transceive program, return it with your order for a £10 discount.

TIF1 kit (assembled and tested PCB + connectors and cables but not MIC connector or box) £15, complete assembled, boxed with all connections £25 (state rig). Using more than 1 rig? No problem, state extra rigs and add £3 for each.

For the listener we have the:

RX-4 MULTIMODE RECEIVE PROGRAM

Lots of features and performance for receiving RTTY, CW, SSTV, AMTOR, Spectrum needs no hardware, BBC-B, CBM64 and VIC20 use TIF1 or a T.U. on RTTY and CW.

Tape £25, disc £27 (not Spectrum, BBC state 40/80 track).

Prices include VAT and p&p, 1st Class inland, airmail overseas, normally by return. Eire, C.I., BFPO deduct 13%.



technical software



From, Upper Llandwrog, Caernarfon LL54 7RF. Tel (0286) 881886

LOSING DX?

ANTENNA FAULT? Poor reports? Not getting out? Check FAST with an **ANTENNA NOISE BRIDGE**, measure resonance 1-160MHz and radiation resistance 2-1000 ohms, no 10 second limit nor confusion with harmonics, ALSO use for phasing lines or RF resistance and hence O of loading coils, **only £24.20**, get answers, **MORE OX.**

ANTENNA TUNER, £28.20, for 100KHz-30MHz ix or 10W tx.

ATOMIC TIME? MSF CLOCK is ALWAYS CORRECT—never gains or loses, SELF SETTING at switch-on, 8 digits show Date, Hours, Minutes and Seconds, EXPANDABLE to Years, Months, Weekday and Milliseconds or use as a STOPCLOCK to show event time, ALSO parallel BCO (including Weekday) COMPUTER and ALARM output and audio to record and show time on playback, decodes Rugby 60KHz atomic time signals, 5 x 8 x 15cm, built-in antenna, 1000Km range, **only £89.80**, get the **RIGHT TIME.**

LINEAR OKAY? Check with a **Two Tone Oscillator, £19.70.**

Each fun-to-build kit (ready-made to order) includes ALL parts, postage, pre-wound coils, fibre glass pcbs, case, connectors, knobs etc and list of other kits.

CAMBRIDGE KITS

45 (RL) Old School Lane, Milton, Cambridge

BRAND NEW COMPONENTS BY RETURN OF POST

VAT Inclusive Postage 20p (Free over £5). List Free

HIGH STABILITY MINIATURE FILM RESISTORS 6% Tolerance
 1W E24 Series 0-51R—10MΩ 1p 175p/100 and value 0-125W E12 Series 4R7 to 1MΩ 2p
 0.5W E24 Series 1R0 to 10MΩ 1p 1-0W E12 Series 1R0 to 10MΩ 5p
 1W metal film 10R to 1MΩ 5% E12 series 2p 1% E24 series 3p

Multis or equivalent Subminiature Ceramic Plate capacitors 100V E12 Series
 2% 1-8p to 47p 3p 2% 56p to 330p 4p 10% 390p to 4700p 4p

Plate Ceramic Capacitors 50V working for vertical mounting
 E12 Series from 22p to 1000p then E6 series 1k 5p to 47k p 2p

Miniature Polyester capacitors 250V working for vertical mounting
 0.1, 0.15, 0.22, 0.33, 0.47, 0.68 4p 0.1 5p 0.15 & 0.22 8p
 0.33 & 0.47 8p 0.68 (250V, 63V) 11p 1-0 15p 1-5 20p 2-2 22p

ELECTROLYTICS Wire Ended (Mfda/Volts)

47/50 5p	10/50 5p	47/15 5p	100/25 7p	220/25 8p	470/40 16p
1-0/50 5p	22/16 8p	47/25 6p	100/50 8p	220/50 8p	1000/15 15p
2-2/50 5p	22/25 6p	47/50 6p	150/16 7p	470/16 11p	1000/25 18p
4-7/50 5p	22/50 6p	100/15 7p	220/16 8p	470/25 11p	1000/35 22p

TAG ENDED CAPS: 5000/30V £1.00 4700/16 25p, 4700/25V axial 70p.

TANTALUM BEAD ELECTROLYTICS Subminiature vertical Mounting (Mfda/Volts)

0-1/35 14p	2-2/35 15p	1-5/16 20p	22/16 30p	47/16 80p
0-22/35 14p	4-7/16 14p	1-5/25 35p	22/25 35p	68/3 30p
0-47/35 14p	4-7/25 15p	22/6 20p	33/10 30p	100/3 35p
1-0/35 14p	10/25 20p	22/10 25p	47-6 30p	220/16 £1.20

POLYSTYRENE Capacitors 63V working E12 Series Long Axial Wires
 10p to 820p 3p 1kpl to 10kpl 4p 12kpl 5p

TRANSISTORS

BC107/8/9 12p	BC547/8/9 8p	BC212L 10p	8FY50/51/52 20p	8FX98 25p
BC147/8/9 10p	BC557/58/9 8p	BCY70 15p	2N2926 7p	DSX196/20 15p
BC157/8/9 10p	BC182L 184L 10p	BF195/67 10p	2N3055 50p	BD135/68 25p

8 pin i.c.s. 741 20p 555 22p Holders 8 pin 9p 14 pin 12 pin 14 pin 28 pin 25p 40 pin 40p

DIODES (p.i.v./amp)

75/25mA 1N4148 2p	800/1A 1N4006 6p	400/3A 1N5404 14p	115/15mA OA91 6p
100/1A 1N4002 4p	1000/1A 1N4007 7p	60/1-5A 5A1M1 5p	100/1A Bridge 25p
400/1A 1N4004 5p	1250/1A 8Y127 10p	30/45mA OA90 6p	30/150mA AAY32 8p

Zener Diodes E24 series 400mW, 3V3 to 33V to 33V 8p, 1 watt 3V3 to 33V 12p.

LEDs Red, Green, Yellow 3 & 5mm, 10p, 8mm, 35p, Green 3 & 5mm, 2p

Fuses 20mm glass 100mA to 5A, 0 Blow 5p, A/Surge 8p, Holders 5p, 1p.s. or chassis

High speed p.c.b. drills 0-8, 1-0, 1-3, 1-5, & 2mm 25p, 12V Drilling machines £8.50

*The C.R. Supply Co. 127 Chesterfield Rd, Sheffield S8 0RN. Tel: 557771

FARNBOROUGH COMMUNICATIONS

97 OSBORNE ROAD, NORTH CAMP

FARNBOROUGH, HANTS



*YAESU*FOK*ICOM*



Stockist of Drae psu's, Jaybeam and Cue Dee Antennas, Microwave Modules, Oskerblock SWR, CDE, RSGB publications, quality cables, our own TVI filters, Welz, Bencher, Mirage amps.

Open Monday to Saturday 10am-6pm

ACCESS + H.P. Available + BARCLAYCARD

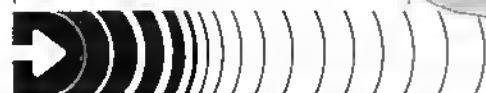
Telephone: Farnborough (0252) 518009

Morse Tutor

Learning morse with D70 is fast and painless. And you can "do it anywhere" because D70 is built to travel and the battery lasts for months. Field proven by thousands of users.

Price: £56.35 Inc. VAT

To order simply dial
(0532) 744822
or write with cheque or postal order to



Dept RC Datong Electronics Ltd., Clayton Wood Close, West Park, Leeds LS16 6QE

Access/Barclaycard welcome — Fast delivery service

Catalogue and data sheets on any product available free on request. Dial (0532) 744822

RADIO SHACK

SCANNERS

A variety in stock including PRO-30 Handheld at £239.95, ADR 2002 Bearcat 150, YAESU FRG-9600.



BC-200FB
16 CHANNEL
£199.95 Now only £159.95

FOR
EVERYTHING
IN

AMATEUR RADIO

RECEIVERS AND TRANSCEIVERS

YAESU • TRIO • ICOM • DRAKE •
COLLINS • INCLUDING THE FABULOUS
KWM380 AT £3,438.50

ANTENNAS

JAY BEAM • HY GAIN • HUSTLER
• ANTENNA SPECIALISTS • AVANTI • MET
• G4MH MINI BEAM • CABLES & CONNECTORS

NEW! 200 CHANNEL HANDHELD SCANNER

Now in stock with package deal incl. memory, batteries,
NiCads and charger/mains psu.
£254.99

ACCESSORIES

DATONG • TELEX • MICROWAVE MODULES

COMPUTERS & PRINTERS

• TANDY •

TELESCAN

Scanner
Antenna.
Normal Version
30-600MHz
£19.95

TELESCAN 2

12dB
Amplified
Antenna.
Automatic
Attenuator
for strong
signals. 60-
600MHz £54.95
(Use in or
outdoors
height 1m)
Carriage on
either £3.45



RADIO SHACK LTD

(Just around the corner from West Hampstead Station on the Jubilee Line)

Giro Account No. 588 7151 Telephone: 01-624 7174 Telex: 23718

188 BROADHURST GARDENS,
LONDON NW6 3AY



SPECIALIST RF COMPONENTS

RF power transistors and special components. UNELCO capacitors.
Transmitting mica trimmers. Low noise VHF/UHF front end transistors.
Japanese equivalents.

Sole Agent for SSM (Thomson CSF) RF transistors.
Phone for Prices. SAE for lists

MODULAR ELECTRONICS

1 Coniston Close, Felpham,
Bognor Regis, Sussex
PO22 8SD Tel 02431 873603

VALVES

VALVES

VALVES

The following valves in matched pairs 6JS6/C, 6KD6, 6JB6/A, 6LQ6, 6HF5, 6146A, 6146B. YES the 6JS6/C is Japanese and works in the FT101. Most amateur radio valves including difficult to obtain types EX STOCK. Quotations without obligation. If we don't stock your type we may be able to import for you, PLEASE ENQUIRE, REMEMBER over 200 types EX STOCK. See list. *Phone for assistance re types suitable for your equipment. USA and Jap manufacture of popular types available.

DON'T DELAY 'PHONE TODAY 045 75 6114. G4AZM
Wilson, Peel Cottage, Lees Road, Mossley, Tameside, Manchester

USED AMATEUR EQUIPMENT?

I Buy, Sell & Exchange!



SELLING?

I pay the BEST POSSIBLE PRICES for your TOP QUALITY used Amateur Equipment!! Or, if that doesn't tempt you, why not let us sell it for you at our competitive commission rates? We have many satisfied customers of our services and it sure beats waiting months for the small ads to appear! Phone Now!

BUYING?

Due to the offers above, I always have a selection of the BEST QUALITY Used Amateur Equipment, available just about anywhere. Everything is inspected and tested by ourselves, whether sold by us, or on behalf of another amateur. Strict standards are kept, ask the people whose rig we didn't buy! Satisfaction of purchase is fully guaranteed on all gear sold at point of sale and our warranty scheme is available beyond that at a small premium. Whether you're looking for the largest or the smallest item in amateur radio, phone us now—and save money!

For the deal you've been looking for—whether BUYING or SELLING—Phone Dave, G4TNY on 1040 241 5122 between 9am & 7pm Mon to Sat. Or call our mobile phone 10636 201530. OR SEND AN SAE FOR OUR COMPUTERISED LISTING!! *Personal callers by appointment Only, please.*

MAIL ORDER

G4TNY AMATEUR RADIO

PART EXCHANGE

132, Albany Road, Hornchurch, Essex RM12 4AQ

AH ELECTRONICS (G8AQN)

151a BILTON ROAD, RUGBY CV22 7AS
Tel: Rugby (0788) 76473

TF144H/4 MARCONI signal generators 10KHz to 72MHz £85.00, a few need repair £35.00 with manuals.
PMR ANTENNA's—7 ele Yagi 145-155MHz 75ohm (Jaybeam) unused £10.00. UHF 460MHz 11 ele Yagi unused £12.00. Mobile 1 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea.
145-155MHz 75ohm (Jaybeam) unused £10.00. UHF 460MHz 11 ele Yagi unused £12.00. Mobile 1 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea.

Please note all above items must be collected by arrangement.

SERVICE MANUALS—for TEKTRONIX SCOPES and plug-ins, plus others send for list. BOLT-IN FEEDTHROUGH CAPS 1000pf 500v 2ba (head 50p each, 10 for £4.50. SOLDER-IN FEEDTHROUGH CAPS 1000pf 500v 3mm dia 10 for 50p. SOLDER-IN FEEDTHROUGH INSULATORS 4mm dia 100 for 75p. OXLEY PTFE leadthrough ins 3-5mm dia 6p each, 10 for 50p, 240pf and 500pf bolt-on anode blocking caps 5Kv wkg Ideal VHF/UHF valve linears, £2.50 ea. 'N' plugs 50 ohm right-angle type ex-equip good cond £1.60. MAGNETIC DEVICES type 354 aerial 12v relays OK up to 200MHz @ 75 Watts s.p.e. £1.75 ea, 2 for £3.00. 2-25pf 10mm dia film trimmers special offer 10p ea, 50 for £2.50, 100 for £4.00. Milled 1-10pf film trimmer 7mm sq 15p ea, 10-80pf compression trimmer P.C. mount OK RF up to 50 Watts 25p. 10-7MHz SSB CRYSTAL FILTERS (less carrier xtal) £12.00. 10-7MHz SSB crystal filter USB only, £6.00 both with data sheet. 2-3v 25Ah CYCLON BATTERIES unused list price over £18.00 our price only £5.00 ea, buy six to make nice 13-8v pack £25.00 post up to 2 off plus £2.00 over 2 post paid. CERAMIC TRIMMERS 10mm dia 10-40pf tag ends sp offer 10p ea, 16 for £1.00. 2GHz TUNNEL DIODES SFD4-163 £1.00 ea, 4 for £3.00. 3SK97 gaslet £2.20. 3SK81 mosfet 85p. BFR84 mosfet 60p. RF POWER—2N5070 24v 25 Watt SSB 30MHz. £5.00. PT4236A 1 Watt 175MHz 12v TO39 case 75p. PT4555 25 Watt @ 144MHz 6db gain 12v £6.00. PT4236C 35 Watt 88MHz 12v 7db gain OK 50MHz £8.00. PT4577 UHF power approx 2 Watt 70cms no info so £1.50 ea. PT 4236B 11 Watt 88MHz 10db gain 12v £4.00. FX1115 beads 10 for 20p.

Many bargains for callers to our shop including loads of test equipment PCBs mixed bags of compts etc plus a complete range of YAESU MUSEN products. Opening times 9.30am to 5.30pm lunch 1.00 to 2.30pm.

MASTS

PDST MOUNTED MOBILE WALL MOUNTED

Designed and manufactured to clients' requirements. Suitable for Radio Communication, Floodlighting, Security Lighting, CCTV etc all at very competitive prices.

Construction is from Hollow Section and the mobile range complies with MOT requirements and EEC Regulations.

Post mounted Tiltover Telescopic masts designed for Amateur Radio use is attractively priced at £247.00 ex works. Mobile masts start from £1,200.00 ex works.

G. S. Greenlees (Design Services) Ltd,
Unit 3, Ladyland Units, School Road,
Kilbirnie, KA25 7AY, Ayrshire.
Tel Kilbirnie (0505) 684810

A KELLY ELECTRONIC AND COMMUNICATION EQUIPMENT

3 STOKES RD, ASTON FIELDS, BROMSGROVE, WORCS B60 3EG
Telephone (0527) 71165

BEST PRICES EVER ON ALINCO MOBILES & HANDELOS

We will sell your equipment on commission basis. Part exchange trade in? 3 month warranty on all second hand equipment sold
Please ask for the best deal to suit you. We also stock Microwave Modules, DRAE, Tar Aerials, RSGB publications, Mutek, Starmaster keys

MANY SPECIAL OFFERS—RING FOR DETAILS
Open 6 Days a Week. Evenings by Appointment
24hr Answerphone



BRAND NEW BRITISH TELECOM SYSTEM 3 RADIO PIFONES

Manufactured by Mobira (synthesised model). Complete with duplexer, cradles, handset and cables. 159/160MHz band. Cradles and duplexers can be used on system 4 or possibly modified for ham bands.

£50.00 each + VAT and p&p.

LINCS RADIO SYSTEMS LTD

64 King Edward Street, Grimsby DN31 3JP. Tel (0472) 57385

HATELY ANTENNA TECHNOLOGY GM3HA

1 Kenfield Place, Aberdeen AB1 7UW, Scotland, U.K.

DIPOLE OF DELIGHT

SKYWARE

UK Patents 2 112 579 B 2 142 120 B
USA Patent 4 518 568 Other patents pending

The Capacitor Balun which is the essential feature of these patents has brought to antenna design

(a) genuine electric field balance at the centre for the coax screen to be connected
(ii) impedance match from the 50 ohm cable to the 600 ohm travelling wave impedance of the wire
(iii) multiband capability when correctly sectioned capacitor groups are used

BEST SELLERS

MP D0 711/21/28L @ £25 which is a medium power dipole of delight for 14.21 and the low part of 28 MHz. It is 21 metres long (59 ft) and weighs 800 grams (1 lb 12 oz) and will radiate 100 Watts of RF (i.e. 1 X PA input up to 200 Watts DC)

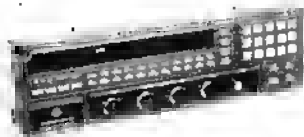
MP D0M 14 @ £10 which is a medium power dipole of delight monoband for 14 MHz. It is 10.6 metres long (35 ft) and weighs 150 grams (5 oz) and will radiate 100 Watts of RF (i.e. 1 X PA input up to 200 Watts DC)

Prices include Free insulators and waterproofing sleeve for the user's coax. There is a UHF socket (SO 238) for connection at the central capacitor balun. We have more than a dozen other versions for up to 21W RF output. For technical data and full list and stock position send stamped self-addressed envelope (small size will do). Price includes UK VAT and first class airmail or for 0x addresses even VAT but includes AIR MAIL. We sell suitable 50mm dia 50 ohm coax at 35p per metre (parcel post paid for antenna purchasers). Also PL 259 coax plugs with reducer at £1.25.

Proprietor: Maurice C Hately, MSc, MIEE, Chartered Electrical Engineer IGM3HAT

GAREX THE SCANNER SPECIALISTS

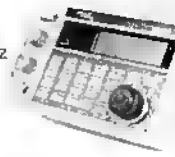
JIL SX-400 THE PROFESSIONAL SCANNER



- Basic coverage 26-520MHz
- AM, NFM & WFM
- Expandable from 100kHz to 1.4GHz with SSB and CW
- Computer control options
- IF output terminals
- Specifications set by professionals

£649

REGENCY MX-8000 THE WIDER RANGE SCANNER



- The receiver with the most Megahertz for your money
- Covers: 25-550MHz, 800MHz-1.3GHz
- AM & NFM & WFM on all bands
- Computer interface socket
- 20 memories
- Compact size
- 12v dc operation
- Up/down sleep control knob

£487

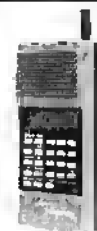
REVCO RS-2000E THE VERSATILE SCANNER



- Covers: 60-180MHz, 380-520MHz
- AM & NFM on all bands
- Search & store of active channels
- Channel activity counter
- 70 memories
- 12v dc & 240v ac

£279

REGENCY HX-2000E THE HAND-HELD SCANNER



- Covers: 60-90MHz, 118-175MHz, 406-496MHz
- AM & NFM on all bands
- Full scan & search functions
- 20 memories
- Nicads, charger & whip antenna included

£279

JIL SX-200N THE SUPERIOR SCANNER



- The choice of the professionals
- Proven reliability
- Covers: 26-88MHz, 108-180MHz, 380-514MHz
- AM & NFM on all bands
- Positive action keyboard
- 16 memories
- 12v dc & 240v ac

£325

DON'T FORGET THE ANTENNA!

All receivers need a good antenna and the ideal one for a scanner is the REVCOE, a 16 element discone. Made in Britain by Revco, a company that has been manufacturing quality antennas for the last 25 years, the REVCOE covers 20-500MHz is extremely well made and very easy to adjust. £29.95



Also available - the RADAC spoke mast, 25.500MHz with extra performance £69.95

PRE-AMPLIFIERS

[Broadband] antennas usually have a gain of 10-15dB. On the other hand, a pre-amplifier amplifies the weak signals but not the noise generated in the feeder cable.

The JIL VCO PAZ is a low noise pre-amplifier with a gain of 10-15dB. It includes a 100k ohm resistor. £19.95

The MUTER BBA5000 is intended for use at the receiver's input. Requires 12v DC at a low rate. £35.50

GAREX ELECTRONICS

MAIN DISTRIBUTOR OF REVCO PRODUCTS. PRICES INCLUDE UK P&P and 15% VAT. Ask for details of our interest free credit.

Extensive range of PYE radiotelephone spares - S.A.E. for list.

7 NORVIC ROAD, MARSWORTH, TRING, HERTS. HP23 4LS.

Phone 0296 686584. Callers by appointment only.

Ask for details of our interest free credit.

Ask for our list of second-hand scanner bargains.

Bredhurst electronics

SITUATED AT SOUTHERN END OF M23 - EASY ACCESS TO M25 AND SOUTH LONDON

HF RECEIVERS

Icom	IC R71	825.00	1-1
Trio	R7000	565.00	1-1
Trio	YC10 VHF Converter	151.48	12.00
Yaesu	FRG 8800	639.00	1-1
Yaesu	FRV 8800 VHF Converter	100.00	12.00

HF TRANSCEIVERS

Trio	TS 940S	1895.00	1-1
Trio	TS 930S	1595.00	1-1
Trio	TS 440S	998.00	1-1
Trio	TS 430S	867.00	1-1
Trio	TS 830S	801.00	1-1
Trio	TS 530SP	848.00	1-1
Yaesu	FT 980	1750.00	1-1
Yaesu	FT 757GX	969.00	1-1
Icom	IC 745	799.00	1-1
Icom	IC 735	549.00	1-1

VHF-SCANNING RECEIVERS

Icom	IC R1000	875.00	1-1
Yaesu	FRG 9500	525.00	1-1
ACR	AR 7002	487.30	1-1
Signal	HS32 "Aaband"	224.00	1-1

VHF HANDHELD RECEIVERS

FDK	ATC 720 "Airband"	189.00	12.50
LDK	IX 40 141-179 Mhz EM	159.00	12.00
Signal	HS37S "Airband"	69.51	12.00

ANTENNA TUNER UNITS

Yaesu	FRT 7700 Short wave listening	59.00	12.00
Yaesu	FC 751AT	345.00	1-1
Trio	AT 2002	185.98	12.50
Trio	AT 750 auto	342.00	1-1
Daiwa	CNV518 High power	258.00	1-1

2M TRANSCEIVERS

Trio	TR 21E Handheld	199.00	1-1
Trio	TR 2600E Handheld	328.00	1-1
Trio	TM 201A 25w 1M mobile	322.00	1-1
Trio	TR 751E 25w multimode	580.00	1-1
Trio	TS 111E base station	639.00	1-1
Yaesu	FT 290R Portable multimode	379.00	1-1
Yaesu	FT 203R + 1NB3 Handheld	255.00	1-1
Yaesu	FT 209R III + 1NB3 Handheld	309.00	1-1
Yaesu	FT 210R 45w 1M mobile	669.00	1-1
Yaesu	ET 720R base station 170cm opti	998.00	1-1
Icom	IC 2E Handheld	225.00	1-1
Icom	IC 02E Handheld	299.00	1-1
Icom	IC 21E 25w mobile	399.00	1-1
Icom	IC 21E base station	635.00	1-1
Icom	IC 3200I 2M/70cm 1M mobile	556.00	1-1

70cm TRANSCEIVERS

Trio	TH 41E Handheld	240.00	1-1
Trio	TR 3500E Handheld	353.00	1-1
Trio	TM 401A 12w mobile	392.00	1-1
Trio	TS 811E base station	998.00	1-1
Yaesu	FT 103R + 1NB3 Handheld	289.00	1-1
Yaesu	FT 709R + 1NB3 Handheld	319.00	1-1
Yaesu	70cm module for FT 726R	349.00	1-1
Icom	IC 4E Handheld	285.00	1-1
Icom	IC 04E Handheld	399.00	1-1
Icom	IC 471E base station	527.00	1-1

OTHER BANDS

Yaesu	FT 680R 6M portable	399.00	1-1
Yaesu	6M module for FT 126R	249.00	1-1
Yaesu	21/25/28 HI module for FT 726R	289.00	1-1
Icom	IC 1211E 1.2 GHz	1140.00	1-1

STATION ACCESSORIES

Drae	VHF wavemeter	27.50	11.50
AKD	VHF wavemeter	24.95	11.50
Yaesu	FF501DX low pass filter 30MHz 1KW	37.50	12.00
Trio	LF 30A low pass filter 30MHz 1KW	30.18	12.00
Adonis	AM 303G desk mic with pre-amp	63.00	12.00
Adonis	AM 503G desk mic with compression	69.00	12.00
SMC	Polar-phaser II	49.00	12.50

ANTENNA SWITCHES

Wely	CH 20N 1300MHz N skts	49.00	11.50
Wely	CH 20A 900MHz SO239 skts	29.95	11.50
SA	450N 2way decast 500MHz N skts	23.75	11.00
SA	450 as above but SO 239 skts.	11.50	11.00
Drae	3way N skts	19.90	11.00
Qias	3way SO 239 skts.	15.40	11.00
CS	4 way BNC skts. 1500MHz	30.39	12.00

ANTENNA BITS

III O	Relax 1:1 SW REP	11.95	11.00
Rolcom	Balon A 1 1KW	11.20	11.00
Rolcom	7.1KW Epyr Traps Ipael	9.95	11.50
Sell	Amalgamating Tape 10M x 25mm	3.95	10.75
I	piece polyprop Dipole centre	1.00	10.25
Small	ceramic egg insulators	0.50	10.15
I	large ceramic egg insulators	0.75	10.15

CABLES ETC.

URM	61 low loss coax 50 ohm per metre	0.75	10.25
UR	70 50 ohm coax dia. 5mm per metre	0.30	10.10
UR	10 70 ohm coax per metre	0.35	10.10
UR	95 50 ohm coax dia. 2.3mm per metre	0.40	10.10
4mm	Polyester Guy Rope 1400kg per metre	0.20	10.10
50mtrs	15 swg hard drawn copper wire	6.90	11.50

BREDHURST ELECTRONICS LTD.
High St, Handcross, W. Sx. RH17 6BW
(0444) 400786



GOODS NORMALLY DESPATCHED WITHIN 24 HRS.
- PRICES CORRECT AT TIME
OF GOING TO PRESS - E&OE
MAIL ORDER & RETAIL



Brenda
G4VXL

A.R.E. Communications Ltd.

38 BRIDGE STREET,
EARLESTOWN,
NEWTON-LE-WILLOWS,
MERSEYSIDE WA12 9BA.
TEL: 09252-29881



Bernie
G4AOG

FOR THE PROFESSIONAL

WE STOCK AND DEMONSTRATE THE LATEST IN COMMUNICATION EQUIPMENT

NRD 525—ICR71—FRG8800—KENWOOD TR2000—AIRBAND—MARINE RECEIVERS + TRANSCIEVERS—VHF + UHF SCANNERS—HF
TRANSCIEVERS

ARE COMMUNICATIONS, 6 ROYAL PARADE, HANGER LANE, EALING, LONDON W5A 1ET, ENGLAND. TELEPHONE: 01-997 4476

ANTENNES TONNA (F9FT)

We are pleased to introduce a new range of antennas (suffix N below). The dipoles have been redesigned and now include a fully sealed 'N' socket, supplied complete with 'N' plug for coaxial cable. Absolutely NO matching or tuning required.

Also a new 1296MHz 55 element long Yagi. Send today for full details. Best spot magnificence! All antennas supplied complete with mast clamps for up to 50mm masts.

All prices include VAT. Carriage extra.

FOR FULL SPECIFICATIONS OF OUR RANGE OF ANTENNAS SEND 40p FOR OUR CATALOGUE. PLEASE ADD CARRIAGE AS SHOWN: (a) £4.00, (b) £2.20, (c) £1.20. MAINLAND ONLY.

Cash with order. ACCESS, VISA CARDS—telephone your card number for immediate dispatch. Callers welcome, but by telephone appointment only, please.

50MHz 20505 144MHz 20804N 20808R 20809R 20809R 20810R 20813R 20817R 425MHz 20909N 20915N 20438 20921N 20927N 144/425MHz 20199	5 element 4 element 4 element crossed 9 element fixed 9 element portable 9 element crossed 13 element portable 17 element 9 element 19 element 19 element crossed 21 element 425MHz 21 element ATV 9819 element Oscar	£37.87 (a) 20624 20640 £24.04 (a) £31.46 (a) £27.78 (a) £29.01 (a) £52.07 (a) £41.40 (a) £55.38 (a) £25.76 (a) £30.91 (a) £36.01 (a) £40.11 (a) £40.11 (a) £36.01 (a)
--	--	--

YOUR NUMBER ONE CHOICE FOR 6m, 2m, 70, 24 and 23cm ANTENNAS

1250MHz 20624 20640 1296MHz or 1269MHz Oscar Uplink 20623 20695 20655 29202 29402 29270 29470 29224 29424 29223 29423	23 element 4 x 23 element—power splitter—stacking frame 23 element 4 x 23 element—power splitter—stacking frame 55 element Power Splitters complete with 'N' plugs 2 way 144MHz 4 way 144MHz 2 way 435MHz 4 way 435MHz 2 way 1250MHz 4 way 1250MHz 2 way 1296MHz 4 way 1296MHz	£27.72 (b) £150.00 (a) £27.72 (b) £150.00 (b) £44.75 (a) £39.24 (b) £44.85 (b) £37.23 (c) £43.41 (b) £31.63 (c) £33.64 (c) £31.63 (c) £33.64 (c)
---	---	--

Portable aluminium telescopic masts 50422 50432 50442 Galvanised steel telescopic masts 50223 50233 50243 50523 Stacking frame kits for 4 antennas 20014 20044 20015 20017 Andrew Helix LDF-50A coaxial cable Attenuation per 100ft 144MHz-800 435MHz +1-6dB 1296MHz-2-9dB £4.00 per metre (a) 'N' type connectors lot 1 DF-4-50 male or female £14.90 (postage fdp) Relators—coaxial cables—connectors	4 x 1m 3.7 metres 3 x 2m 5.7 metres 4 x 2m 7.7 metres 2 x 3m 5.9 metres 3 x 3m 8.8 metres 4 x 3 11.7 metres 5 x 3m 14.6 metres 20809 or 20818 20919 or 20921/22 20623/24 horiz 20623/24 vert 20017 20017	£23.00 (a) £25.44 (a) £38.53 (a) £32.05 (a) £57.64 (a) £92.86 (a) £125.64 (a) £46.72 (a) £31.05 (a) £17.97 (b) £14.52 (b) £31.63 (c) £33.64 (c) £31.63 (c) £33.64 (c)
---	--	---

SOLE UK DISTRIBUTOR
RANDAM ELECTRONICS (R)

12 Conduit Road, Abingdon, Oxon OX14 10B. Tel: (0235) 23080 (24 Hours)

APPROVED
TRIO
DEALER

WARD ELECTRONICS

APPROVED
TRIO
DEALER

Choose from the
Comprehensive Range
of TRIO quality
Communications Equipment



TS440S £980

HF Transceiver with Gen Cov
Receiver.
All modes included

TS830S
£981



TS711E
£839



TR751E
£580



LOTS MORE MODELS IN THE
RANGE—COME AND SEE

Scarab
Radio Software and Hardware
CBM • BBC • AMSTRAD

Daiwa Quality Products
VHF Linears
Power Supplies

We stock a full range of products, books and kits
Just the thing for your Xmas gift ideas!

TRIO
MC85 Mic £95.45

'KENT'
Morse Key Kits £19.95

Howes Kits
QRP Projects

WARD ELECTRONICS
422 BROMFORD LANE, WARD END
BIRMINGHAM B6 2RX Tel: 021-328 6070
CLOSED MONDAY

• KEYS • ROTATORS • SWR METERS • PSUs • ANTENNAS • RS66 BOOKS •

J. BIRKETT

25 THE STRAIT, LINCOLN. Tel: 20767

POWER VMOS FETS VN90AA, @ 80p, VN10KN @ 50p, WM211 @ 40p, VN10LM @ 40p, 25 AMP 600 PIV THYRISTORS (SCR'S) @ £1.50 each. WIRE ENDED CAPACITORS 0.1uF 400V @ 10p, 0.1uF 1000V @ 20p. PLASTIC POWER TRANSISTORS NPN 2SC1095, 10Watt 60MHz @ 45p, 2SC1226, 10Watt 70MHz @ 45p, PNP 2SA699, 10Watt 70MHz @ 45p, SILVER PLATED 75 + 75p, AIR SPACED VARIABLE CAPACITOR @ £2.30. FETS J304 @ 6 for £1, E304 @ 7 for £1, J230 @ 5 for 60p, 2N3819 @ 20p, BF256 @ 20p, D TYPE CONNECTORS 15 Way Socket @ 60p, 37 Way Socket @ 85p, 1000 MULLARD CR25 RESISTORS Assorted for £2.50. 50 POLYSTYRENE CAPACITORS Assorted @ 75p, 30 SILBER MICA Assorted @ 50p. X BAND GUNN DIODES With Data @ £1.65. SCHOTTKY X BAND DETECTOR DIODES Like 1N23 @ 45p. BAND TUNING VARIABLE DIODES 2 p.i. or 4 p.i. both £1.65 each. 1N4007 WIRE ENDED DIODES 1000 Piv 1Amp @ B for 50p. MULLARD CERAMIC PLATE CAPACITORS 630V 1000p.i., 0.01uF @ 25p. DOZ. TUBULAR TRIMMERS 50p.i., @ 15p, 10p.i., @ 15p, 10 Watt STUD MOUNTING ZENERS 18, 22, 33, 47, 68, 100Vall All 50p. 2GHz STRIPLINE NPN TRANSISTORS 18 volt @ 3 for £1.15. ITT CRYSTAL FILTERS Type 014DG 10.7MHz BW ± 3.75KHz @ £3.95. TAG ENDED ELECTROLYTICS 16 + 16uF 350V @ 35p, 16 + 16uF 450V @ 45p, 32 + 32uF 350V @ 45p, 50 + 50uF 450V @ 75p. CRYSTALS HC18U 5.998MHz, 15.974MHz, 36MHz, 66.986MHz All £1.00 each. HC25U 6.075MHz, 26583MHz, 53.675MHz All £1.00 each.

WOOD AND DOUGLAS KITS AVAILABLE FOR CALLERS AND BY POST.
ACCESS AND BARCLAY CARDS ACCEPTED, P.P. 60p UNDER £5 OVER FREE.

UPPINGTON

COMMUNICATION ELECTRONICS
G2BAR BERT RS8566 PAUL GIDOK PETER

G2BAR HAM BAND AERIALS
GAMMA MATCHED YAGI ARRAYS (Carriage extra)

	2EI	3EI		
6M	£18.50	£22.00	THE G5RV	
10M	£56.00	£66.70	MULTIBAND DIPOLE	
15M	£68.00	£80.50	FULL SIZE 1/2 SIZE	
20M	£88.50	£103.50		
ZL SPECIAL	12ELE £25.00	P&P £3.50	80-10 MTRS	40-10 MTRS
TYPE	7ELE £14.50	P&P £3.00	£16.25	£14.25
ANTENNAS	5ELE £10.50	P&P £2.50	+ 1.80 P&P	+ 1.80 P&P

AMATEUR ELECTRONICS UK

12/14 PENNYWELL ROAD, BRISTOL BS5 0TJ

Telephone: Bristol (0272) 557732/558578

C.M.HOWES COMMUNICATIONS

139, Highview, Vigo,
Meopham, Kent,
DA13 0UT England.
Fairseat(0732)823129



Surprisingly long distances can be covered with simple QRP (low power) equipment! Many of our customers have worked over 30 countries in their first couple of weeks on the air with our CTX80, 80M CW transmitter. Some have worked most of the USA call areas in the same period! The CTX80 runs up to 5W RF output (adjustable) and comes complete with one crystal. The transmitted note is very clean, in fact superior to many expensive transceivers. We also have CW transmitters for 40 and 20 Meters in the form of the CTX40 and MTX20. The MTX20 with its 10W RF output has no trouble in working around the globe.

You can use our transmitters with your existing receiver or with our DeRx (Direct Conversion Communications Receiver). This receiver is a good example of how effective simple equipment can be, if it is well designed. Try running a DeRx side by side with the most expensive receiver you can lay your hands on, you will be amazed how well our Mini set stands up to the comparison! These receivers have also been an introduction to shortwave listening for hundreds of newcomers to the hobby. Add a CVF VFO to the DeRx and CTX/MTX and you have the full transceiver facilities of single knob tuning and IRT (clarifier). HOWES equipment is great for holiday and portable use, as well as for the fun of QRP operating from home!

	Kit	Assembled PCB
DeRx Direct Conversion Receiver (versions for 160, 80, 40, 30 or 20 Meters)	£15.30	£20.90
CTX80 80M QRP CW Transmitter (up to 5W RF)	£13.40	£19.40
CTX40 40M QRP CW Transmitter (up to 3W RF)	£13.40	£19.40
MTX20 20M QRP CW Transmitter (up to 10W RF)	£21.90	£27.70
CVF VFOs for above TXs (one version per band)	£9.90	£15.90
CTU30 Antenna Tuner for all HF bands up to 30W RF	£24.90	£29.90
Tuning capacitors for the DeRx receiver (except 160M version) are available at £1.50 each, you need two per receiver. One of the same devices can also be used for the CVF.		

All the above kits are to build PCB modules. They include a circuit board, full instructions and all board mounted components. For more information on the above, or the rest of our range, simply drop us a line enclosing an SAE. We will send you a copy of our catalogue, and an information sheet on any kit you are particularly interested in.

P&P is 90p per order. Export prices are as above, but add £2.00 per kit for airmail delivery outside Europe. UK delivery is normally within 7 days.

73 from Dave G4KQH, Technical Manager.



EASY TO BUILD KITS BY MAIL ORDER

CUE DEE

**THE PROFESSIONAL
ANTENNA AT AN
AMATEUR PRICE!**

5 YEAR GUARANTEE

**HF-VHF-UHF
ANTENNAS TOWERS
AND ACCESSORIES**

Dealer inquiries welcome

Distribution Europe



Classic International
Communications

Postbus 1020 6040 KA Roermond
Netherlands

KW TEN-TEC CORSAIR II

No frills, "gimmicks" or unused facilities—For the serious Phone/CW operator who wants the lowest noise, cleanest and most selective amateur HF transceiver on the world market.



Other KW TEN-TEC winners

The ARGOSY II phone/cw transceiver

The CENTURY 22 cw only transceiver

The original KW TRAP DIPOLE and TRAPS, 8 ATU's, KW BALUN, and antennas

WRITE OR PHONE FOR DETAILS

KW TEN-TEC LIMITED

Vanguard Works, Jenkins Dale, Chatham, Kent ME4 5RT
Telephone: 0634 815173

Worried about faults developing? There's no need to blow a fuse!

Help is at hand through the Amateur Radio Maintenance Service which offers you **COMPLETE COVER** for the cost of repairs.

Here's how it works... in the event of a breakdown you simply take or send the equipment covered to an authorised dealer and arrange for the necessary repairs to be carried out. You then advise us in writing of the breakdown, enclosing a paid receipt for the job — and a cheque in full settlement is normally sent out within a few days!

Sounds interesting? Then read on...

For example, a two-year-old Transceiver costing £1,000 new could be covered against breakdown for £30 a year. Without cover, a repair bill for, say, replacement of P.A. transistors, labour and carriage charges could add up to a **STAGGERING** £140 to £160. And just think what an intermittent fault could cost to trace and put right!

Where's the catch? There isn't one: all we ask is that you sign a simple maintenance contract and that the equipment to be covered is in full working order before we start.

Remember, this is **NOT** an insurance policy — adequate ones are available elsewhere. **THE AMATEUR RADIO MAINTENANCE SERVICE CONTRACT STARTS WHERE INSURANCE LEAVES OFF...**

In return for a modest annual fee based on a small percentage of the new retail value of the equipment we will reimburse the client against the cost of repairs resulting from breakdown including:

Labour charges — currently running at £17.25 per hour including VAT, Replacement parts, and Carriage costs to an approved service agent where appropriate.

AND WE RELIEVE YOU OF ANY WORRIES ABOUT THE EQUIPMENT DEVELOPING EXPENSIVE FAULTS.

To find out more about the cover available, including details of a very special introductory offer, just write to:

Amateur Radio Maintenance Service,
FREEPOST, Ormskirk,
Lancashire L39 3AB
(No stamp required)



AMATEUR ELECTRONICS UK

G6XBN
G1RAS
G8UUS

R.A.S. (Nottingham)
Radio Amateur Supplies
Tel: 0602 280267



Visit your Local Emporium

Large selection of New/Used Equipment on Show

AGENTS FOR:

F.D.K.
AZDEN
ICOM
YAESU
ALINCO
KENPRO

ACCESSORIES:

Wet Range
Microwave Modules
Adonals Mics
Mulek Pre-Amps
Barenco Mast Supports

DRAE products
BNOS Linears and
PSUs

Agents for VODAPHONE & CELLNET

AERIALS: Tonna, Halbar, Jaybeam, New Diamond Range of Mobile Whips

Bring in your secondhand equipment for sale

JUST GIVE US A RING

Monday: CLOSED Tuesday-Saturday: 10am to 5pm

3 Farndon Green, Wollaton Park, Nottingham NG8 1DU
Off Ring Rd, between A52 (Derby Road) & A609 (Ilkeston Road)

AX.25 PACKET RADIO

Come and join the packet revolution

PAC-COMM TNCs still available

Built and Tested £199.00 (£3.50p+p)

Full kit £169.00 (£3.50p+p)

PCBs + Software and part kits also available

* **STOP PRESS** *
* **DRAMATIC PRICE REDUCTIONS ON TNCs** *
* **LOW COST TNCs AVAILABLE NOVEMBER** *
* **Ring for latest details** *

AMDAT Crofters, Harry Stoke Road
Stoke Gifford Bristol BS12 6QH
(0272) 699352/559398



**£500 of Electronic Equipment
to be WON in the new**

Cirkit catalogue.



★ £8 worth discount vouchers

★ 164 pages featuring over 3,000 products.

★ Many new products, plus all the old favourites

★ £500 worth of electronic equipment and components to be won in our catalogue competition.

★ On sale at your newsagent from 16th October, or direct from the address below.



Cirkit Distribution Ltd



Park Lane, Broxbourne, Herts, EN10 7NQ Tel: (0992) 444111, Tlx: 22478

INDEX TO ADVERTISERS

A. J. H. Electronics.....814	Jaycee Electronics.....810
Amateur Electronics Ltd.....IFC	J. E. P. Electronics.....808
Amateur Radio Maintenance Service 818	
Amcomm/ARE.....758/9	A. Kelly.....814
AMDAT.....818	KW Ten-Tec Ltd.....817
ARE Communications Ltd.810 & 816	
	Lines Radio Systems.....814
J. Birkell.....816	Low Electronics.....750/3
Bredhurst Electronics.....815	
Bunae Travel.....819	Modular Electronics.....813
Cambridge Kits.....812	QuartLab Marketing Ltd.....810
Cambridge GRP Components.....808	
Cirkit Distribution Ltd.....818	Radio Shack.....813
Classic International.....817	Random Electronics.....816
CR Supply.....812	R. A. S. (Nottingham).....818
	RS Electromail.....IBC
Oatong Electronics.....813	
Oavirend Limited.....811	South Midland Comms.....762/4
	Stephens-James.....811
Fairborough Communications.....812	
	Technical Software.....812
G4TNY Amateur Radio.....814	
Garex Electronics.....815	Uppington Tele-Radio.....816
G. Greenlees Ltd.....814	
Haley Antenna Technology.....814	Reg Ward Co Ltd.....810
Heatherlite Products.....810	Ward Electronics.....816
C. M. Howes Communications...817	Waters & Stanlon.....809
	C. Wilson.....813
ICOM/Thames Electronics.....754/7	
ICS Electronics Ltd.....760/1	Yaesu Musen.....OBC

CLASSIFIED ADVERTISEMENTS

Classified advertisements 35p per word (VAT included), minimum £5.60
Box Number £2.00 extra to wordage or minimum.

Semi-display 1/8 page 2 1/2" x 3 1/2" (57 x 91mm) £87.00
3/32 page 1 1/2" x 3 1/2" (42 x 91mm) £67.00
1/16 page 1" x 3 1/2" (26 x 91mm) £47.00

Please write clearly: No responsibility accepted for errors.
Latest date for acceptance—7 weeks before 1st of issue month.
All classified and semi-display advertisements MUST be prepaid.

Copy and remittance to: M. J. HAWKINS G3ZNI, RSGB Advertisements,
PO Box 599, Cobham, Surrey KT11 2QE.

Cheques should be made payable to RSGB.

Members' Ads must be sent to "Members' Ads," RSGB Hq.

INCREASE IN CLASSIFIED RATE

With effect from the January 1987 issue, the rate for Classified advertisements will be increased to 40p a word (£34.78p + 5.22p VAT). This has been necessitated by the increase in production costs since the rate was last fixed two years ago in January 1985. All orders with payment received before Friday 5th December will be accepted at the old rate.

FOR SALE

OSL CARDS printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey. [073 72] 44916.

AMIDON TOROIDAL CORES, ferrite rings for TVI filters, lorry beads. Send SAE for data and prices. SMC (TMP Electronics), Unit 27, Pinfold Works, Pinfold Lane, Buckley, Chwyd.

G5RV TYPE AERIALS. Half-size £13.50, Full-size £15.50. New Hard Drawn Copper Aerial Wire, 140ft 14swg £7.90; 50 metres 16 swg £6.90. Enamelled soft copper wire 10 metres 12swg £3.50; 50 metres PVC covered Aerial wire £4.20. Ceramic Egg Insulators, 40p. Guy rope, 4mm Polypropylene, 50 metres £3.95; 4mm Nylon 50 metres £6.90. 1kw 1:1 Baluns £13.00. All items post paid. S.M. Talham G3RSY, 1, Orchard Way, Fontwell, Arundel, West Sussex.

PERSONALISED OSL CARDS. 1000 £15.00; 5000 £50.00. 5000 gloss in two colours £70.00. Send SAE for samples. [DIY OSL's/SWL's—stato which!!—100 mixed designs/colours, £2.50. C.W.O.] O/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.

50m [165ft] AERIAL WIRE. Strong PVC covered copper only, £4.40 inc postage. W. H. Westlake, Clawton, Holsworthy, Devon.

OSL CARDS. Gloss or lined cards, SAE for samples to Twrog Press, Penybont, Gellidan, Blaenau Ffestiniog, Gwynedd.

ALL THE FAMOUS MOSLEY ANTENNAE. TA33Ji, Mustang, Atlas, V-3Ji, TD-3Ji Beams, Verticals, etc. Also spares available only direct from us. Send £1 for our Handbook showing all Antennae. Mosley Electronics, 196 Norwich Road, New Coslessey, Norwich NR5 0EX.

WAVEGUIDE, FLANGES & DISHES. All standard sizes and alloys (new material only) from stock. Special sizes to order. Call Earth Stations, 01-228 7876, 22 Howie Street, London SW11 4AR.

DSL CARDS. Try me for quality and price. SAE for samples. A. W. Bailey [G3YNI], Broad Down Press, Wick Lane, Lymington, Somerset.

G2VF 1/4 LOOP ANTENNAS Long, Medium or Short Wave, SAE details. Rylands, 39 Parkside Avenue, Southampton SO1 9AF.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET" [iron] and [real] similar to Police and Ambulance, etc. Also "RAYNET CONTROLLER", 2 sizes. Medium, £8.00; Large, £8.50 inc p.p. Details Mike Watson G8CPH. Ipswich [0473] 831448.

ANTI-TVI TRAP DIPOLES, TRAPS for beams, verticals or wire aerials. Baluns. Oala sheets 24p SAE. Aerial guide £1. [039 86] 215. G2DYM, Updown, Devon EX16 7PH. OSL CARDS CLEAR HANGING display wallets. Holds 20 large size cards. Pack of 3, £2.40. Viola Plastics, 36 Croll Road, Hastings, Sussex.

CLIP ON FEEDER SPREADERS. 3" pack of 25, £5.00. 6" pack of 20, £8.00. 16swg hard drawn copper wire, 14p per metre. All post paid. Viola Plastics, 36 Croll Road, Hastings, Sussex.

ICOM PORTABLES. MRZ Desk Top PSU for Icom Portables 2e/4e/02E/04E. Incorporating overvoltage protection—overcurrent shutdown—£61.95 + £3.00 [carriage]. Models available for PMR/Marine Icoms. MRZ 6amp [continuous] 12v.d.c. PSU £59.95. MRZ for Icom and Yaesu equipment. MRZ Communications Ltd, 248 Uffington Road, Longton, Stoke-on-Trent, [0782 6] 9658.

ORP COMPONENTS. SAE for list, or component guide £1.65 inc p.p. Resistor pack, 60 values, 600 1/4 Watt resistors, £5.45 inc p.p. Cambridge ORP Components, 30 Rookery Close, St Ives, Cambridgeshire PE17 4FX. Tel. [0480] 68330.

GWM RADIO LTD. 4042 Pottland Road, Worthing, Sussex. Tel [0903] 34897. Many one off bargains for callers. No lists. P.x welcomed.

THE SEMICON INDEX. Have you seen the advertisement on page 666 of the September issue?

G4TJB OSL CARDS. Personal and standard designs. SAE samples. 100 matt colour DIY £2.50, gloss £3.50. Logbooks £2.20 [mobile £1.20]. Buro envelopes £1.00 [20]. Navy Special. HF mobile and base station antennas. SAE for details and price list. G. C. Patterson G4TJB, 24 Portishead Road, Worle, Weston-super-Mare, Avon BS22 0UX.

100dB STEP ATTENUATOR. Good beyond 150MHz, £26.00. Other SWL products. SAE lists. Theasby Electronics, 31 Middleton, Cowling, Keighley, West Yorkshire BD22 0DQ.

MASTERPLUG/CON8LOCK. range of mains adaptors and distribution units, as mentioned in TT [March 86 Rad Com]. Complete range in stock at competitive prices. Please send SAE for full details. P. L. Kenyon, PO Box 7, Knighon, Powys LD7 1AA.

CMOS KEYS, IAMBIC, dot dash memory insertion and many features. 3 models £26.50, £43.30, £59.95; SAE for details. Chris Thayne, 14 Tynedale Avenue, Whitley Bay NE26 3BA.

FOR SALE (continued)

HEAVY COPPER PLATED CHASSIS. Fingerslock, Cathode/heater connectors: Beryllium copper fingerslock for 4CX250/350 anodes, 7289/3CX100A5 anode and grid. £4.00/ft. Silver plated cathode/heater connectors. £6.30 each. Copper plated K2RIW 70CM chassis, also W2GN 2M [2 x 4CX250/350]. Fully punched, mesh lilled, £89.00 [p&p £3.00]. All parts available. Ehl psu's for 4CX range also 7289/3CX100A5. Details and orders to V. Gordon, 19 Brampton Rd, Oakdale, Poole. BH15 3RE.

G3LLR OFFERS. 6M Units for FTV 901R £149, FT 401 PA Valves green banded 6KD6 Stamped 'NEC' (Believed made Toshiba) matched pair £32. FT101MK1-E NEC 6JS6C matched pair £29.50, 12BY7A NEC £9.50, 12BY7A G.E. £5, FT101ZD, FT901, etc. G.E. 6146B pair £26; matched 3 £39. CW Filters 300HZ. FT101ZD £32. FT101MK1-E £29. Double balanced mixers RX Improvement FT101E/B £16. New band WARC kit FT101E/B £15. Black Slar 600 MHz counters £139. 6/1 Epicyclic drives FT 401/101 £3.75. Z match 160m conversion kits £5.99. Post & Handling £1.25 per order. Holdings/Amateur Electronics, 45 Johnson Street, Blackburn BB2 1EF. [0254] 59595.

PRINTED ADDRESS LABELS for OSL cards 3p. Stamped SAE details, Mr D. Slack, 34 Cheyney Avenue, Salhouse, Norwich NR13 6RJ. 12VDC DRILLS, 1000rpm. 3" x 1.34", £10.50. Many accessories available. Large SAE for details. R. Leigh, PO Box 599, Worthing.

G8DAH (DECEASED) IC-741E. 25W 70cm multimode with speech synthesiser. Perfect. £525.00. G3ZY, QTHR. Chesterfield 866060.

MODULE 11 FOR PR1551 Plessey receiver. Bird Thru-line, elements and associated equipment. Tel. [0333 06] 613 after 7pm and weekends.

EUROPE'S FINEST CMOS SQUEEZE EL-KEYER. ETM-5C, £85.00. ETM-8C (4096 bit memory), £135.00 [p&p £2.50]. SAE details. G5BM, QTHR. Tel. [0531] 820960.

RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

COMPUTER SOFTWARE/HARDWARE

AMPROM is the low cost entry to ASCII communications. For BBC B, B+ and now also for Master, SAE for details. CTP Software, 107A Shackwell Lane, London E8 2EB.

88C/ELECTRON: G4UXD Morse program [review lopper, June Radcom] does everything—variable speed/delay; 850 words; 100 plain-language 3-min tests; tests your sending and much more: £5.95 [tape]. D. Brandon, Woodlands Rd, Chester CH4 8LB.

AMSTRAD 464 CW TRANSCIVE. Split screen, type ahead plus log screen. £8.50. Also log keeping and others. SAE for details to M.C. Foden. G3UPA QTHR. G4BMK PACKET RADIO BREAKTHROUGH. Full AX25 [Level 2 version 2] stand alone software for Dragon 32/64 or Tandy Color. Package price for callidg software plus built VHF 1200 Baud modem £99. HF and kit options available soon. Full range of supporting software—RTTY CW AMTOR SSTV. SAE for details. Grosvenor Software, 2 Beacon Close, Seaford, Sussex [0323] 893378.

HOLIDAY ACCOMMODATION

FLYING FROM GATWICK? Stay with G4MGU. Mill Lodge Guest House, 4 minutes from airport. Transport available. Telephone [0293] 771170.

NORTH DEVON. Exmoor lodging. Bed, breakfast, evening meal, Janet and Dick G8BUJ. The Spinney Guest House, Shirwell, Nr Barnstaple, Devon.

SELF-CONTAINED FLATS. Open all year. Reduced rates RadCom readers. Linden House, Ruckamore Road, Torquay TQ2 3J3.

MISCELLANEOUS

COURSE FOR CITY & GUILDS. Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses [GCE, Career and professional examinations, etc] write or phone—THE RAPID RESULTS COLLEGE, Dept JT12, Tuition House, London SW19 4DS. Tel: 01-947 7272 [9am-5pm] or use our 24hr Recordcall service 01-946 1102 quoting JT12.

HEATHKIT. UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Telephone [0684] 73127.

WANTED

WANTED—SMALL FIRM OR individual to develop a single channel VHF [marine band] radio receiver. Then produce 20. Details from Box 202, PO Box 599, Cobham, Surrey KT11 2OE.

EE8 AMERICAN FIELD TELEPHONES, any condition, any quantity. Phone Monday-Friday 9-5pm. 01-743 0899.

SUMMER JOBS IN THE USA FOR 1987

American children's summer camps are seeking bright, enthusiastic young people aged 19½-35 to live with and teach amateur radio skills to children from mid-June to mid/end August. Return flight, special work visa, food and accommodation arranged PLUS \$300-\$350 pocket money for the season. A challenging and rewarding programme for those who don't mind hard work and who have a genuine regard for children. If you have the relevant experience, and would like further details of this fantastic opportunity to work and travel in the USA for up to 6 weeks after camp), please contact:

ROD CAROL,
BUNACAMP, 232 VAUXHALL BRIDGE ROAD,
LONDON SW1V 1AU. Tel: 01-630 0344.

RSGB MAIL-ORDER PRICE LIST

	Non-members' price	Members' price		Non-members' price	Members' price
RSGB books			Other publications		
<i>A Guide to Amateur Radio</i> (19th edn)	£4.14	£3.52	<i>All About Cubical Quad Antennas</i> (RPII)	£7.73	£6.57
<i>Amateur Radio Operating Manual</i> (3rd edn)	£6.52	£5.54	<i>Amateur Radio Computer Networking Conference Papers Vols 1-4</i> (ARRL)	£22.29	£18.95
<i>Amateur Radio Software</i>	£8.69	£7.39	<i>Amateur Radio Computer Networking Conference Papers Vol 4</i> (ARRL)	£11.16	£9.49
<i>Buyer's Guide to Amateur Radio Equipment</i>	£8.09	£6.88	<i>Amateur Radio Computer Networking Conference Papers Vol 5</i> (ARRL)	£12.24	£10.40
<i>HF Antennas for All Locations</i>	£7.79	£6.62	<i>Amateur Television Handbook</i> (revised) (IBATCI)	£3.25	£2.76
<i>How to Pass the Radio Amateurs' Examination</i>	£3.62	£3.08	<i>Antenna Compendium Vol 1</i> (ARRL)	£10.29	£8.75
<i>Microwave Newsletter Technical Collection</i>	£7.23	£6.15	<i>ARRL Antenna Book</i> (ARRL)	£11.29	£9.60
<i>Morse Code for Radio Amateurs</i>	£2.29	£1.95	<i>AX25 Amateur Packet Radio Link-layer Protocol</i> (ARRL)	£5.68	£4.83
<i>RSGB Amateur Radio Call Book, October 1986</i>	£5.75	£4.89	<i>Basic Radio Electronics</i> (Wiley)	£17.71	£15.05
<i>Radio Amateurs' Examination Manual</i> (11th edn)	£4.07	£3.46	<i>Beam Antenna Handbook</i> (RPII)	£8.22	£6.99
<i>Radio Communication Handbook Vol 2</i> (lib)	£8.96	£7.62	<i>Better Short Wave Reception</i> (RPII)	£7.57	£6.43
<i>Radio Communication Handbook Vol 1 & 2</i> (pbl)	£14.10	£11.99	<i>Carn End Feeding of Variational Power Grid Tubes</i> (ARRL)	£11.07	£9.41
<i>Radio Data Reference Book</i> (15th edn)	£9.13	£7.76	<i>CMOS Cookbook</i> (Sams)	£14.47	£12.30
<i>Raynet Manual</i> (1986 edn)	£3.25	£2.76	<i>Complete DX'er</i> (ARRL)	£8.60	£7.31
<i>Teletypewriter Handbook</i> (2nd edn)	£7.67	£6.52	<i>Complete Shortwave Listener's Handbook</i> (Tabl)	£13.53	£11.60
<i>Television Interference Manual</i> (2nd edn)	£2.45	£2.08	<i>Design of VMOs Circuits with experiments</i> (Sams)	£9.40	£7.99
<i>Test Equipment for the Radio Amateur</i>	£6.79	£5.77	<i>DX Edge</i> (If propagation Aid)	£15.65	£13.30
<i>VHF/UHF Manual</i> (4th edn)	£11.20	£9.52	<i>DX Power: Effective Techniques</i>	£11.75	£9.99
<i>World at Your Fingertips</i>	£8.21	£6.98	<i>FM and Repeaters for the Radio Amateur</i> (ARRL)	£4.75	£4.04
RSGB logbooks			<i>G-ORP Club Circuit Book</i>	£5.00	£4.25
<i>Amateur Radio Logbook</i>	£2.93	£2.49	<i>Guide to Oscar Operation</i> (Amsat-UK)	£1.97	£1.67
<i>Mobile Logbook</i>	£1.30	£1.11	<i>International VHF FM Guide</i> (G3UHK/G8AUU)	£3.85	£3.27
<i>Receiving Station Logbook</i>	£3.04	£2.58	<i>Joy of ORP</i> (Adrian Weiss, W0RSP)	£9.40	£7.99
RSGB maps, charts and lists			<i>Linear Op Amp Handbook</i> (Carl)	£12.93	£10.99
<i>HF Awards List and Countries List</i>	51p	43p	<i>Microwave Communication Handbook</i> (Wiley)	£12.75	£10.84
<i>Great Circle DX Map</i> (wall)	£2.57	£2.18	<i>Morse Code, the Essential Language</i> (ARRL)	£3.99	£3.39
<i>IARU Region 1 Beacon List</i>	42p	36p	<i>Oscar 10 Handbook</i> (Amsat-UK)	£3.87	£3.29
<i>Locator Map of Europe</i> (wall)	£2.07	£1.76	<i>ORP Notebook</i> (ARRL)	£4.71	£4.11
<i>Locator Map of Europe</i> (card for desk)	75p	64p	<i>Radio Amateurs' Antenna Handbook</i> (RPII)	£8.72	£7.41
<i>Locator Map of Western Europe</i> (wall)	£3.24	£2.75	<i>Radio Amateur Callbook International Listings 1987</i> (ARRL)	£19.43	£16.52
<i>Meteor scatter data sheets</i>	£3.72	£3.16	<i>Radio Amateur Callbook North American Listings 1987</i> (ARRL)	£19.98	£16.98
<i>Smith Charts, pad of 25</i> (Chartwell D7510)	£2.35	£2.00	<i>Radio Amateurs' Handbook 1986</i> (ARRL)	£8.18	£6.95
<i>UK Beacon List</i>	42p	36p	<i>Radio Communication Receivers</i> (Tabl)	£17.43	£14.82
<i>UK Repeater List</i>	63p	45p	<i>Radio Frequency Interference</i> (ARRL)	£4.63	£3.94
<i>World Prefix Map in full colour</i> (wall)	£2.68	£2.28	<i>RTTY the Easy Way</i> (IBARTGI)	£4.69	£3.99
RSGB members' sundries (members only)			<i>Satellite Experimenters' Handbook</i> (ARRL)	£11.19	£9.51
<i>RSGB badge car sticker</i>	—	53p	<i>Secrets of Ham Radio DXing</i> (Tabl)	£8.78	£7.46
<i>RSGB belt (real leather)</i>	—	£7.57	<i>Semiconductor Data Book</i> (Nownes)	£8.80	£7.48
<i>RSGB tie</i> (cotton, maroon, green or blue—please state)	—	£3.20	<i>Simple Low-cost Wire Antennas</i> (RPII)	£10.55	£8.97
<i>RSGB call sign cap</i>	—	£4.98	<i>Towards the Radio Amateurs' Examination</i> (Sams)	£4.77	£4.05
<i>RSGB logo rubber stamp</i>	—	£3.16	<i>Towers International Digital IC Selector</i>	£10.58	£8.99
<i>RSGB t-shirts</i> (medium, large or extra large—please state)	—	£4.90	<i>Towers International MOSPower and other FET Selector</i>	£10.58	£8.99
<i>RSGB Green Book</i> (details structure, organization and objectives of the Society)	—	£1.85	<i>Towers International Transistor Selector</i>	£15.46	£13.14
<i>Standard call sign lapel badge</i> (Five weeks' delivery)	—	£3.18	<i>Towers Op Amp Selector</i> (Foulsham)	£10.99	£9.34
<i>De-luxe call sign lapel badge</i> (Five weeks' delivery)	—	£3.18	<i>Tune in the World with Ham Radio</i> (ARRL)	£5.15	£4.38
<i>Standard lapel badge</i> (RSGB emblem, pin fitting)	—	60p	<i>TV for Amateurs</i> (IBATCI)	£2.45	£2.08
<i>Mini lapel badge</i> (RSGB emblem, pin fitting)	—	72p	<i>Understanding Amateur Radio</i> (ARRL)	£5.20	£4.42
<i>Members' headed notepaper</i> (50 sheets) quarto	—	£1.20	<i>Vertical Antenna Handbook</i> (ICQ)	£11.40	£9.69
<i>Members' headed notepaper</i> (50 sheets) octavo	—	76p	<i>VHF Handbook for Radio Amateurs</i> (RPII)	£13.71	£11.65
Miscellaneous			<i>World Atlas</i> (ARRL)	£3.72	£3.16
<i>Call sign rubber stamp</i>	£3.47	£2.95	<i>99 Test Equipment Projects You Can Build</i>	£10.75	£9.14
<i>Car sticker "Amateur radio"</i> (two colours)	78p	66p	Interference suppression filters		
<i>Car sticker "I'm on the air with amateur radio"</i> (four colours)	89p	76p	<i>Braided cable filter</i>	£6.46	£5.49
<i>Car sticker "I'm monitoring 5 are you?"</i> (two colours)	78p	66p	<i>Ferrite toroid</i> (pack of two)	£2.99	£2.54
<i>Radio Communication back issues</i>	£1.40	£1.19	<i>High-pass filter for fm broadcast band 2</i>	£6.46	£5.49
<i>Radio Communication bound volume, 1983</i>	£17.90	£15.22	<i>High-pass filter for uhf tv</i>	£7.12	£6.05
<i>Radio Communication bound volume, 1984</i>	£17.90	£15.22	<i>Kit of 10 different filter types</i>	£54.70	£46.50
<i>Radio Communication bound volume, 1985</i>	£17.90	£15.22	<i>Notch filter tuned to 145MHz</i>	£7.33	£6.23
<i>Radio Communication Easybinder</i>	£7.90	£6.72	<i>Notch filter tuned to 435MHz</i>	£6.46	£5.49
<i>RSGB coffee mug</i> (plastic)	£2.16	£1.84	Language and morse instruction aids		
<i>RSGB hf contest log sheets</i> (100)	£3.69	£3.14	<i>Radio Amateurs' Conversation Guide</i> (IOH1BRI)	£5.49	£4.67
<i>RSGB vhf contest log sheets</i> (100)	£3.69	£3.14	<i>Dutch supplement to Conversation Guide</i>	£1.12	£0.95
			<i>French cassette supplement to Conversation Guide</i>	£4.41	£3.75
			<i>German cassette supplement to Conversation Guide</i>	£4.41	£3.75
			<i>RSGB morse instruction tape</i> (to 5wpm)	£4.80	£4.08

ORDERING INFORMATION

NON-MEMBERS. Use left-hand price columns. Note that members' sundries are only available to members of RSGB.

MEMBERS. Use right-hand price columns. It is essential that you quote your call sign or BRZ number so that you can be recognised as a member.

PRICES. These include postage, packing and VAT where applicable, and are subject to change without notice. For airmail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 10am and 4pm, Monday to Friday.

POSTAL TERMS. Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Our Giro account number is 5335256. Please write your name and address clearly on the order, and allow up to 28 days for delivery.

*Items marked with an asterisk may not be available immediately; please telephone before ordering to confirm availability.

ORDER FROM: RSGB Publications (Sales), Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

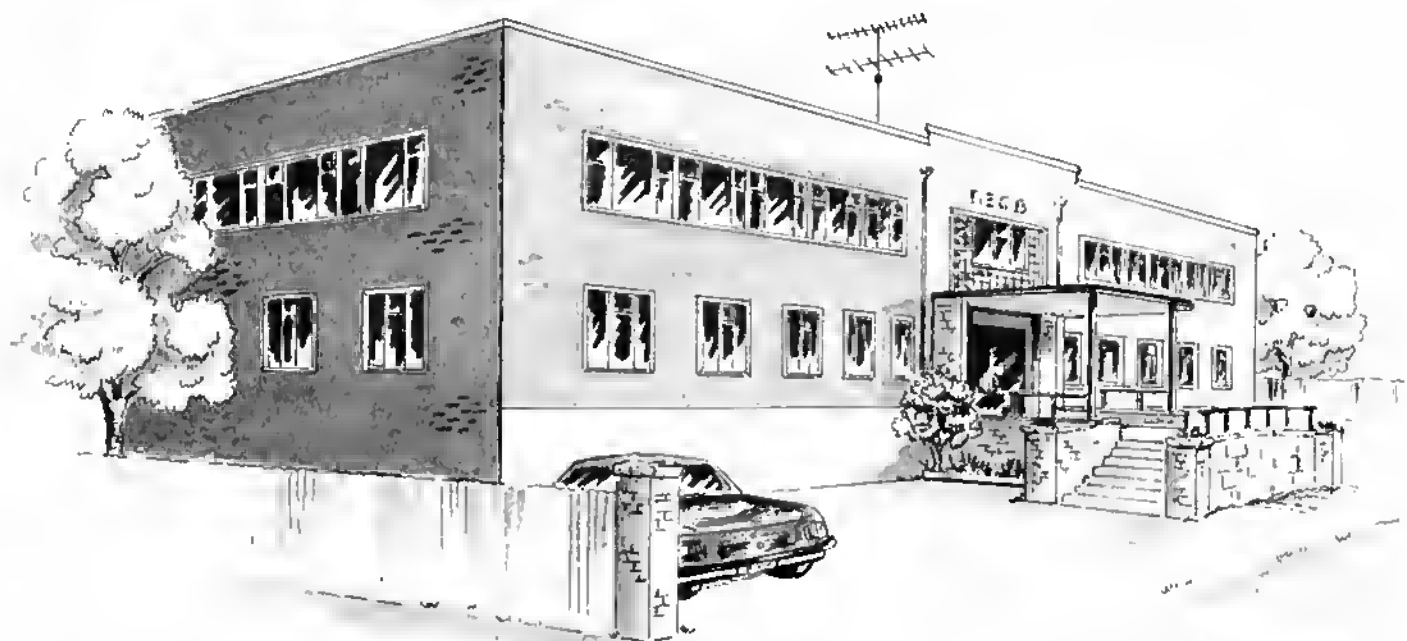
(For details of RSGB newsletters and Raynet supplies, contact the Circulation Dept at RSGB HQ)

MAGAZINE SUBSCRIPTIONS

<i>QST</i> (including ARRL membership). One year	£33.39	£28.38
Two years	£63.53	£54.00
Three years	£95.02	£80.77
By air via KLM (to W Europe only) one year	£47.45	£40.33
<i>Ham Radio Magazine</i> , one year, by air	£34.69	£29.49



RADIO SOCIETY OF GREAT BRITAIN



RSGB HEADQUARTERS
LAMBDA HOUSE

REPORT & ACCOUNTS
and
THE YEAR IN REVIEW

for the year ended 30 June 1986

RADIO SOCIETY OF GREAT BRITAIN

(COMPANY LIMITED BY GUARANTEE)

LAMBDA HOUSE, CRANBORNE ROAD, POTTERS BAR, HERTS EN6 3JE

PATRON: HRH The Prince Philip; Duke of Edinburgh, KG

COUNCIL
(1 July 1985 to 30 June 1986)

President
W J McClintock, G3VPK

Executive vice-President
K E V Willis, BSc, ARCS, CEng, MIEE, G8VR**

Immediate past-President
J Heathershaw (Mrs), G4CHH

Honorary treasurer
P F D Cornish, FCA, G3COR

Members
E J Allaway, MB, ChB, MRCS, LRCP, G3FKM
J T Barnes, G13US
E J Case, GW4HWR**
D S Evans, PhD, BSc, FIM, G3RPE
J N Gannaway, G3YGF
F D Hall, GM8BZX
J Greenwell, G3AEZ**
J D Heys, G3BDQ**
H M Holmden, G4KCC*
G R Jessop, CEng, MIERE, G6JP*
A A McKenzie, G3OSS**
B O'Brien, G2AMV
N F O'Brien, G3LP**
H S Pinchin, BSc, MBIM, G3VPE
J M Pratt, BTech, CEng, MIEE, MIERE, G3KEP*
F S G Rose, G2DRT**
D S Smith, G4DAX

*Retired 31 December 1985
**Elected 1 January 1986

Secretary
D A Evans, G3OUF

Auditors
Moore & Rowland, chartered accountants

Bankers
Barclays Bank PLC

Financial report of Council to members of the Radio Society of Great Britain for the year ended 30 June 1986

Council has pleasure to present the audited accounts of the Society and its subsidiaries for the year ended 30 June 1986 which are set out on Pages (iii) to (vi).

The income and expenditure account for the year showed a surplus on ordinary activities before taxation of £10,103. Provisions for Corporation Tax absorbed £6,200, leaving a net surplus of £3,903 which is added to the Society's accumulated funds.

The surplus for the year were a little greater than the budget; there were inevitably some increases in expenditure but these were more than offset by increases in income and receivables.

Total subscription income for the year reflects partly a full year at the same rates and an increase in demand for the various news-sheets etc. There was a very small increase in overall membership.

Advertising volume fell slightly during the year but was compensated by increases in rates. Sales of books and other products showed a welcome increase over the previous year, although their net contribution after deducting the direct costs was reduced.

Total expenditure on Headquarters premises during the year was some £10,000 lower than in the previous year. In December 1985 the Society completed the purchase of the yard areas adjoining Headquarters and this brought with it an increase in rates. An appeal has been lodged against the rating assessment, it having previously been based on industrial use rather than the present use to which the Society puts it. The accounts also show that expenditure on repairs and maintenance was minimal during the year compared with the previous year. However, during the financial year 1986-7, a good deal of expenditure will be incurred upon some refurbishing of the premises coupled with work to bring them up to the requirements of the fire regulations. This will cost the Society approximately £10,000.

Overall administration expenses were some £20,000 greater than in the previous year. This was due principally to an increase in the proportion of staff cost attributed to administration. Note 6 to the accounts shows that the overall increase in staff costs in all departments of the Society amounted to a little over £15,000 or a five per cent increase on the previous year. Part of that was due to an increase in numbers of staff as is shown in Note 6 to the accounts.

Finance costs were assisted by a reduction in the provision required for bad debts. The actual bad debts experience during the year was rather less than had been provided for, and this is reflected by a credit or writing-back under the heading Bad Debts Provision.

The total costs of membership services fell slightly during the year. The reduction in cost of *Radio Communication*, the net cost of rallies, exhibitions and publicity, and the cost of committee, regional and Council meetings was offset by increases in the cost of international meetings and conferences and of the IARU Region 1 contribution and levy. In the year under review the levy was increased from Swiss Francs 1.15 to SF1.50, and that, together with an increase in the number of licensed members, produced an increase of some £3,000.

The balance sheet continues to show a healthy position. The cash flow for the year was obviously affected by the outflow of funds required to complete the purchase of the land at Lambda House (£45,000) and additions to the equipment used at Headquarters. For the first time in three years the adjustment to the accumulated fund was a positive one of £3,903 compared with deficits of £30,720 and £50,242 in 1985 and 1984 respectively.

The measures taken to contain expenses and generally increase income referred to in last year's Report have borne their fruit. Those measures are still being put into effect and should ensure that the Society will have a satisfactory outcome for the year to 30 June 1987.

RADIO SOCIETY OF GREAT BRITAIN

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 30 JUNE 1986

	Notes	1986		1985	
		£	£	£	£
INCOME					
Subscriptions	(1)		549,333		510,589
Advertising	(1)		209,174		202,876
Book sales			306,337		280,240
Other income	(5)		20,494		19,708
TOTAL INCOME			<u>£1,085,338</u>		<u>£1,013,413</u>
EXPENDITURE					
Cost of book sales					
Cost of printing and distribution		167,303		146,545	
Costs of editing and despatch staff		71,037	238,340	58,423	204,968
Headquarters					
Rates, lighting, heating and cleaning		24,538		20,951	
Repairs and maintenance		963	25,501	14,329	35,280
Administration					
Staff costs		199,896		176,647	
Telephone, postage, printing and stationery		76,024		82,463	
Insurance		4,509		4,296	
Hire and maintenance of equipment	(7)	54,045		51,360	
Depreciation of fixed assets	(1)	17,340		20,177	
Audit fees		8,000		8,400	
Legal and professional fees		9,946		7,475	
General expenses		6,456	376,216	5,681	356,499
Finance					
Bank interest		78		203	
Bank charges		2,977		3,340	
Bad debt provision		(3,495)	(440)	1,510	5,053
Membership services					
Radio Communication	(8)	343,102		345,305	
Certificates, awards, trophies, etc		857		2,928	
QSL Bureau		18,409		17,023	
Beacons, repeaters, satellites and Intruder Watch		8,688		7,116	
IARU Region 1 contribution and levy		13,156		10,137	
Rallies, exhibitions and publicity	(9)	7,153		9,659	
Cost of committee, regional and Council meetings		40,606		43,573	
Cost of international meetings and conferences		3,647	435,618	749	436,490
TOTAL EXPENDITURE			<u>£1,075,235</u>		<u>£1,038,290</u>
SURPLUS/(DEFICIT) ON ORDINARY ACTIVITIES BEFORE TAXATION					
[all of which arises in the Society]			10,103		(24,877)
Less provision for taxation thereon at 30% (1985: 30%)	(10)	(6,000)		(7,000)	
(Under)/Over provision for corporation tax in previous year		(200)	(6,200)	1,157	(5,843)
SURPLUS/(DEFICIT) FOR YEAR			<u>£3,903</u>		<u>£(30,720)</u>

RADIO SOCIETY OF GREAT BRITAIN

BALANCE SHEETS AT 30 JUNE 1986

												1986		1985		
												The Society	The Society and subsidiaries	The Society	The Society and subsidiaries	
												£	£	£	£	
												Notes				
FIXED ASSETS																
Tangible assets	...	...	...	...	...	...	...	...	...	(1)	(2)	...	413,712	413,712	377,499	377,499
Investments	...	...	...	...	...	...	...	...	...	(3)	...	...	200	—	200	—
												413,912	413,712	377,699	377,499	
CURRENT ASSETS																
Stocks, at lower of cost and net realizable value	...	...	...	...	...	...	...	...	...	...	...	...	152,557	152,557	183,439	183,439
Trade debtors	...	...	...	...	...	...	...	...	...	...	...	...	58,659	58,659	40,959	40,959
Prepayments and accrued income	...	...	...	...	...	...	...	...	...	...	...	...	44,003	44,003	37,726	37,726
Cash at bank and in hand	...	...	...	...	...	...	...	...	...	...	...	...	93,766	95,765	123,137	125,186
												348,985	350,984	385,261	387,310	
CREDITORS: AMOUNTS FALLING DUE WITHIN ONE YEAR																
Bank overdraft	...	...	...	...	...	...	...	...	...	...	...	...	—	—	(54,779)	(54,779)
Trade creditors	...	...	...	...	...	...	...	...	...	...	...	...	(32,387)	(32,387)	(29,617)	(29,617)
Amounts due to subsidiary companies	...	...	...	...	...	...	...	...	...	...	...	...	(215,567)	—	(215,567)	—
Corporation tax	...	...	...	...	...	...	...	...	...	...	...	...	(7,200)	(7,200)	(6,843)	(6,843)
Other taxation and social security	...	...	...	...	...	...	...	...	...	...	...	...	(24,317)	(24,317)	(8,922)	(8,922)
Other creditors	...	...	...	...	...	...	...	...	...	...	...	...	(19,174)	(20,343)	(18,546)	(19,765)
Accruals and deferred income	...	...	...	...	...	...	...	...	...	...	...	...	(34,874)	(34,874)	(16,803)	(16,803)
												(333,519)	(119,121)	(351,077)	(136,729)	
Subscriptions in advance	...	...	...	...	...	...	...	...	...	...	...	...	(265,736)	(265,736)	(251,471)	(251,471)
												(599,255)	(384,857)	(602,548)	(388,200)	
NET CURRENT LIABILITIES												(250,270)	(33,873)	(217,287)	(890)	
Total assets less current liabilities												163,642	379,839	160,412	376,609	
CREDITORS: AMOUNTS FALLING DUE AFTER MORE THAN ONE YEAR																
Corporation tax payable 1 January 1988	...	...	...	...	...	...	...	...	...	...	...	...	(6,000)	(6,000)	(7,000)	(7,000)
												157,642	373,839	153,412	369,609	
PROVISIONS FOR LIABILITIES AND CHARGES																
Deferred taxation	...	...	...	...	...	...	...	...	...	(1)	(10)	...	(2,000)	(2,000)	(2,000)	(2,000)
												£155,642	£371,839	£151,412	£367,609	
ACCUMULATED FUNDS																
Income and expenditure account																
Balance at 1 July 1985	...	...	...	...	...	...	...	...	...	...	...	...	149,596	365,793	180,316	396,513
Surplus/(deficit) for year	...	...	...	...	...	...	...	...	...	...	...	...	3,903	3,903	(30,720)	(30,720)
												153,499	369,696	149,596	365,793	
Legacy fund	...	...	...	...	...	...	...	...	...	(4)	...	...	2,143	2,143	1,816	1,816
												£155,642	£371,839	£151,412	£367,609	

(The notes on pages v and vi form part of these accounts)

Approved by the Council on 25 September 1986, and signed on its behalf by:

W. J. McClintock, MSc, President

P. F. D. CORNISH, FCA, *Honorary treasurer*

NOTES ON THE ACCOUNTS

1. Accounting policies:

- (a) Subscriptions—cash received in respect of subscriptions for the year has been apportioned on a time basis from the actual dates subscriptions were receivable, after deduction of VAT.
- (b) Advertising income is the net amount receivable, after deduction of VAT, for advertisements in *Radio Communication*.
- (c) Depreciation—tangible fixed assets, except freehold land, are written off using the straight-line method over their estimated useful lives at the following rates based on cost:
- | | |
|--------------------|----------------------------|
| Freehold buildings | — 2 per cent per annum |
| Furniture | — 10 per cent per annum |
| Equipment | — 20–25 per cent per annum |
| Computer | — 20 per cent per annum |
- (d) Deferred taxation has been provided using the liability method in respect of timing differences which are not expected to continue for the foreseeable future.
- (e) Since a consolidated income and expenditure account is submitted, no such account for the Society alone has been presented.

2. Tangible fixed assets

Cost	Freehold land and buildings	Furniture, equipment and computer programming	Total
	£	£	£
At 1 July 1985	367,572	96,581	464,153
Additions	50,000	3,553	53,553
At 30 June 1986	<u>£417,572</u>	<u>£100,134</u>	<u>£517,706</u>
Depreciation			
At 1 July 1985	19,053	67,601	86,654
Charge for the year	6,351	10,989	17,340
	<u>£25,404</u>	<u>£78,590</u>	<u>£103,994</u>
Net book value			
At 30 June 1986	<u>£392,168</u>	<u>£21,544</u>	<u>£413,712</u>
At 1 July 1985	<u>£348,519</u>	<u>£28,980</u>	<u>£377,499</u>

Freehold land included above amounts to £100,000 (1985: £50,000).

3. Fixed asset investments

	1986 £	1985 £
Shares in group companies at cost	<u>£200</u>	<u>£200</u>

The subsidiaries are Lambda Investment Company Limited (an investment company) and RSGB (Raynet) Limited, which has been dormant since incorporation. The share capital of both companies comprises ordinary shares and is wholly owned by the Society.

4. Legacy fund

	1986 £	1985 £
Balance at 1 July 1985	1,816	1,830
Donations received	327	86
Payments made in accordance with donors' directions	—	(100)
Balance at 30 June 1986	<u>£2,143</u>	<u>£1,816</u>

5. Other income includes bank interest of £12,096 (1985: £17,805).

6. Staff costs

	1986 £	1985 £
Wages and salaries	275,363	261,285
Social security costs	25,772	25,122
Pension costs	9,781	8,754
	<u>£310,916</u>	<u>£295,161</u>

The average number of persons employed by the Society was 30 (1985: 29), divided into the following categories:

	1986	1985
Headquarters	23	22
Radio Communication	4	4
QSL Bureau	2	2
Advertising	1	1
	<u>30</u>	<u>29</u>

7. Lease rentals for equipment amounted to £22,814 (1985: £21,671). The only significant leasing arrangements are in connection with the IBM38 computer in relation to which the Society has a commitment to pay £15,336 annually until 31 December 1987.
8. *Radio Communication* expenses comprise the whole of the costs of printing and distribution, the cost of editorial and advertising staff and the Chelmsford office.
9. Rallies, exhibitions and publicity expenses comprise:

	1986	1985
	£	£
Society publicity and advertising	7,646	7,847
(Surplus)/deficit on the Society's own events and the cost of participation in other rallies and exhibitions	(493)	1,812
	<u>£7,153</u>	<u>£9,659</u>

- Book sales totalling £36,470 gross (1985: £40,604) made at rallies and exhibitions have been accounted for under income from book sales.
10. The Society is liable to pay corporation tax on its investment and trading income. Tax deferred owing to the effects of capital allowances has been provided for in full. The potential taxation liability, not provided for in these accounts, in respect of capital gains rolled over is £65,000.
 11. The Society administers certain prize and memorial funds, totalling £666 (1985: £669) which are not included in these accounts.
 12. Authorised Capital commitments contracted for at 30 June 1986 amounted to £6,500, (1985: £45,000).

CONSOLIDATED STATEMENT OF SOURCE AND APPLICATION OF FUNDS FOR THE YEAR ENDED 30 JUNE 1986

	1986	1985
	£	£
SOURCE OF FUNDS		
Surplus/(deficit) for the year before taxation... ..	10,103	(24,877)
Donations received (less payments made) from legacy fund	327	(14)
Adjustment for items not involving the movement of funds:		
Depreciation (including losses on disposals)	17,340	20,176
Total generated by (absorbed by) operations	<u>27,770</u>	<u>(4,715)</u>
APPLICATION OF FUNDS		
Purchase of fixed assets, less proceeds of sale	(53,553)	(12,808)
Corporation tax paid	(6,843)	(10,656)
	<u>(£32,626)</u>	<u>(£28,179)</u>
INCREASE/(DECREASE) IN WORKING CAPITAL		
Stocks	(30,882)	39,893
Debtors, prepayments and accrued income	23,977	(43,354)
Creditors, accruals, deferred income and subscriptions in advance	(51,079)	13,733
	<u>(57,984)</u>	<u>10,272</u>
MOVEMENT IN NET LIQUID FUNDS		
Cash balances less bank overdraft	25,358	(38,451)
	<u>(£32,626)</u>	<u>(£28,179)</u>

REPORT OF THE AUDITORS TO THE MEMBERS OF THE RADIO SOCIETY OF GREAT BRITAIN

We have audited the accounts set out on pages iii to vi in accordance with approved auditing standards.

In our opinion the accounts, which have been prepared under the historical cost convention, give a true and fair view of the state of affairs of the Society and its subsidiaries at 30 June 1986 and of their surplus of income and of their source and application of funds for the year ended on that date and comply with the Companies Act 1985.

Clifford's Inn,
Fetter Lane,
London EC4A 1AS.
25 September 1986

MOORES & ROWLAND
Chartered Accountants

THE YEAR IN REVIEW

Some of the activities of the Society in the year ended 30 June 1986

SECRETARY'S REPORT

MAIN POINTS

Despite very heavy and continuing pressure, the financial year 1 July 1985–30 June 1986 must be regarded as a success for the Society. We note that a small financial surplus was achieved, amounting after tax to £3,903, which should be compared with the 1983–4 and 1984–5 deficits of £50,242 and £30,720 respectively. Book sales this year have increased by £26,097 (9.3 per cent) and the membership rose by 1.3 per cent. Although these increases are small, they must be judged against the present, and hopefully temporary, somewhat depressed state of amateur radio. The latter can be illustrated by the marked fall in the sales of amateur equipment and a significant reduction in the number of those applying to sit the Radio Amateurs Examination.

This pressure on amateur radio exists worldwide, and Council has recognized that if facilities such as common working frequencies and freedom from excessive restrictions on operating conditions are to be kept to a minimum, and if amateurs are to be offered greater, not lesser, potential, then national societies must work closer and closer together through the IARU. During the year, Council has encouraged this directly by sending delegates to attend the IARU Region 3 Conference in New Zealand, and to other overseas meetings. It has also made it more possible for staff to devote significantly more effort to these problems on both the national and international level, by agreeing the recently-announced changes made to the HQ administration.

PUBLICATIONS

The major change in this area has been the return of the *Radio Communication* editorial department from Chelmsford to RSGB HQ. This long-awaited step is, of course, very welcome for its own sake. However, it has in addition allowed the integration of the effort available for the magazine with that for books to produce a more effective publications group. This has many advantages; one important one being the flexibility of bringing in extra staff effort to handle the peak loads associated with the production of the magazine, which we hope may result in reduced lead-time.

Also on publications, the April 1986 edition of the *RSGB Call Book* has proved very popular. The listing in terms of callsign where the country is excluded rather than by a country by country basis has been generally welcomed, as has the inclusion of much useful information. The intention is to expand this information in the next edition to make it even more of a "Members' Handbook".

COUNCIL AND COMMITTEES

The Society's 51st President, Mrs Joan Heathershaw, G4CHH, completed her term of office at the end of 1985. Joan was the RSGB's first lady President, and her forthright and down-to-earth North-Country approach to the job brought her wide popularity; she visited many events on the Society's behalf and was an excellent ambassador for the hobby. In recognition of that, Council has invited Mrs Heathershaw to be President again in 1987.

Mr W McClintock, G3VPK, took office on 1 January 1986. He was officially installed as President in Chelmsford on 18 January 1986.

There were seven vacancies for the 1986 Council, of which five were for ordinary members. These were filled by Messrs J D Heys, G3BDQ; A A McKenzie, G3OSS; N F O'Brien, G3LP; F S G Rose, G2DRT; and K E V Willis, G8VR. A ballot was held in respect of Zone C, and Mr J Greenwell, G3AEZ, was elected. No ballot was necessary in respect of Zone E, since Mr E J Case, GW4HWR, was elected unopposed.

Four Council members did not continue their membership of Council in 1986, Messrs R G Barrett, GW8HEZ; G R Jessop, G6JP; and D M Pratt, G4DMP, were not eligible for re-election under Article 26. Mr H M Holmden, G4KCC, stood down, having served on Council for three years.

At its first meeting in 1986, Council elected Mr K E V Willis, G8VR, as

ATTENDANCE AT COUNCIL MEETINGS

	1985				1986			
	27/7	26/9	26/10	28/11	18/1	6/3	26/4	26/6
E J Allaway, G3FKM	—	x	x	—	x	—	x	x
J T Barnes, G1UUS	x	x	x	x	x	x	x	x
R G Barrett, GW8HEZ	x	—	—	x	—	—	—	—
E J Case, GW4HWR	x	x	x	x	x	—	x	x
P F D Cornish, G3COR	—	x	—	x	—	x	—	—
D S Evans, G3RPE	x	x	x	x	x	—	x	—
J N Gannaway, G3YGF	x	x	x	x	x	x	x	x
J Greenwell, G3AEZ	—	—	—	—	x	x	x	x
F D Hall, GM8BZX	x	x	x	x	x	x	x	x
J Heathershaw, G4CHH	x	x	x	x	x	x	x	x
J D Heys, G3BDQ	—	—	—	—	x	x	x	x
H M Holmden, G4KCC	x	x	x	x	—	—	—	—
G R Jessop, G6JP	x	x	x	x	—	—	—	—
W J McClintock, G3VPK	x	x	x	x	x	x	x	x
A A McKenzie, G3OSS	—	—	—	—	x	x	x	x
B O'Brien, G2AMV	x	x	—	x	x	x	x	x
N F O'Brien, G3LP	—	—	—	—	x	x	x	x
H S Pinchin, G3VPE	x	x	x	x	x	—	x	x
D M Pratt, G4DMP	—	x	x	—	—	—	—	—
F S G Rose, G2DRT	—	—	—	—	x	x	x	x
D S Smith, G4DAX	x	x	x	x	x	x	x	x
K E V Willis, G8VR	x	x	x	x	x	x	x	x

executive vice-President for the year.

During the period under review, Council and its 16 committees held a total of 105 meetings; Council met eight times.

LIAISON WITH THE RADIO REGULATORY DIVISION OF THE DTI

As always, a prime function of the Society is to maintain a continuing dialogue with the UK licensing authority, which in the UK is the Radio Regulatory Division of the Department of Trade & Industry. The objects of this liaison are to maintain and, where possible, enhance the facilities available to the UK radio amateur, and to ensure as far as possible that he or she has a positive framework in which to operate. In many ways some quite spectacular progress has been made during the year in review, although it must be added that some quite severe problems remain to be solved to the Society's satisfaction. The continuing level of spectrum abuse is one, but the topic of most concern to the Society at present is the increasing number of problems involving "electromagnetic compatibility" in one form or another.

The year in review got off to an excellent start, however, following the ministerial announcement on 28 June 1985 that radio amateurs in the UK would receive a 500kHz allocation at 50MHz. Some seven months later, on 1 February 1986, the band 50.00–50.50MHz was released to UK Class A licensees in a further step in the development of the band. In allowing UK radio amateurs access to part of the spectrum allocated in Europe to television broadcasting, it must be said that the DTI was ploughing a lone furrow in the face of considerable pressure from other European administrations not to do so. For this reason the Society accepted that there would have to be initial restrictions and conditions associated with the allocation. It was less happy with the condition restricting initial access to the band to Class A licensees, which was associated with the DTI's wish to limit the number of amateurs operating at 50MHz. Accepting the statistical case put forward by the department, the Society proposed several ways in which its requirements could be achieved; however, the DTI felt strongly that initial access to the allocation must be restricted to Class A licensees only. In the light of operating experience gained at 50MHz during the year in review, the Society is optimistic that some of the current 50MHz operational restrictions will be removed or modified during 1987.

On 26 July 1985 it was announced in the House of Commons that a review of the Radio Investigation Service by the DTI had produced 128 separate recommendations. The outcome of the review was essentially

that the RIS would be re-orientated towards an enforcement role and would carry out what was referred to as "... a phased withdrawal from the time-consuming effort put into dealing with domestic tv and radio reception problems". It was also stated that more RIS resources would be devoted to dealing with pollution of the radio spectrum by those who operate without licences and those who abuse their licences. However, these activities would be undertaken by a staff numbering 240, compared with 340 before the DTI took over the RIS. The DTI was also to publish a booklet concerning the solving of radio and tv reception problems. A call-out charge of £21 would have to be paid before the RIS would visit a complainant. There were various other provisions, which were reported in the September 1985 issue of the *RSCG News Bulletin* and elsewhere.

The Society had—and retains—mixed feelings about this development. It was obviously good news that problems of spectrum abuse were to receive more attention, and indeed there has been some improvement in the position in recent months. However, as has been extensively discussed in the pages of *Radio Communication* during the year in review, the withdrawal of the RIS from domestic-type interference problems has had some most undesirable side-effects. The Society views the attempt by central government to place responsibility for the solution of everyday breakthrough problems in the hands of the radio and tv trade as ill-advised. It also greatly regrets that the positive effect of the RIS officer as impartial mediator between radio amateur and neighbour has now been made less effective. Departing from strict chronology for the sake of completeness, it was unfortunate that the Radio Investigation Service's new strategy as regards the amateur service—which was discussed earlier—was brought to light in the pages of the April 1986 issue of *Radio Communication*. It was said at the time that "... the Society (has) most severe reservations about both the quality and the scope of the strategy", and to a large extent those reservations still stand. However, an enormous number of man-hours have been spent in this area by staff and volunteers, both in dealing with general policy and with a few cases in which individual members have run into serious problems. The Society has also had extensive discussions with its legal advisers, and has engaged outside consultants where this has proved necessary. It is expected that this work will continue to be undertaken on an intensive and high-priority basis, and various possibilities were being explored by the end of the year in review. The Society is pleased to be able to report that some progress has been made and that it now has a declared "strategy" of its own—see the September 1986 issue of the *RSCG News Bulletin*. It very much hopes that the worst aspects of this matter can now be tackled in conjunction with the DTI in a positive and constructive way.

In September 1985 the DTI confirmed that a review of all radio-user licences was in hand. The outcome of this did not fall, strictly speaking, during the year in review, although for the sake of completeness the Society is pleased to note that amateur radio was virtually the only service for which the licence fee was not increased!

On 14 October 1985—just prior to Jamboree-on-the-Air—it was announced that the privileges accorded to special event stations in respect of greetings messages passed by unlicensed third parties had been extended. Third-party greetings messages could now be exchanged with stations in the USA, Canada and the Falkland Islands. It goes without saying that the Scouting movement was delighted with this news and made good use of the facility during JOTA '85.

On 18 October 1985 the DTI issued a long-awaited press release concerning duplex and crossband working by radio amateurs. This had the effect of clarifying some historical anomalies, and was the result of a good deal of work on the Society's part.

The January 1986 issue of *Radio Communication* carried a special feature on the forthcoming 50MHz band. This was particularly notable for its publication of two special items written by DTI staff, in which some of the department's thinking behind the new allocation and the reasons for the restrictions associated with it were set out in some depth. The Society was pleased that the DTI was prepared to go into detail in this way for the benefit of the membership, and hopes that this has set a precedent for the future. It was also pleasing to note that the UK's lead in the matter of 50MHz was shortly to be followed by some other European administrations, and that amateurs in Eire and Portugal would shortly have access to the band.

In April 1986 the Society was able to report some prosecutions for illicit operation, complete with names and addresses. The DTI has now acceded to the Society's request for prosecution statistics to be made available for publication, although it still has to rely on its own sources for more detailed information; the department has not yet agreed to reinstate the policy of publication of such information which it curtailed in the mid-seventies.

The Society compiled a report for the DTI on the Class B Morse experiment during March 1986, largely on the basis of the questionnaire carried in the *RSCG News Bulletin* earlier in the year. No less than 91 per

cent of those who replied were in favour of the facility becoming a permanent feature of the Class B licence, and this duly became the case; the DTI issued a press release early in May 1986, and the full details were carried in the June 1986 *RSCG News Bulletin*. It is fair to say that this addition to the terms of the Class B licence is a most important concession, which has been highly praised by many Class B licensees working towards their Class A licence. The Society was delighted with the outcome of its work in this area, which had taken considerable time and effort to achieve.

The sharp increase of interest in packet radio led to some preliminary discussions with the DTI in May 1986. Strictly speaking, this area does not quite fall into the timescale implied by the year in review; for the sake of completeness, however, it is worth mentioning that the DTI has taken a favourable line towards packet radio and data communications in general, and the initial stages of a packet repeater network—with which are associated rig repeaters and unattended operation—are currently awaiting clearance.

From the point of view of liaison with the licensing authority, the year in review has been basically a very successful one, but also one in which some difficult issues which are central to the future of amateur radio have been raised. Certainly the liaison is intensive; staff are in touch with the DTI most working days on a wide range of matters, and it is estimated that there were more than 500 telephone conversations between Waterloo Bridge House and RSCG HQ during the year in review. There were also some 150 letters and telexes and about 500 man-hours spent in meetings, not taking into account the preparatory work on the part of committee members and headquarters staff and of course the staff in the Radio Regulatory Division. We look forward to a continuing close relationship between the Society and the DTI, and also of course between ourselves and the hard-working and professional staff of the Post Office's Radio Amateur Licensing Unit at Chesterfield. Members of both bodies have visited headquarters during the year in review and have seen something of our operations; we hope that we have been able to show them some of the facets of our very special hobby and that the "amateur" sobriquet is something of a misnomer.

THE SOCIETY AND THE MEDIA

In last year's notes under this heading, the point was made that radio as such is no longer newsworthy; it was remarked that "... In an era when the man-in-the-street has easy and cheap access to global communication and his sees pictures from the other side of the world each evening on television, the primitive magic of radio communication over a distance has long since lost its power". A year on, that position has, if anything, hardened. The explosion in cellular radio—far outweighing the most optimistic forecasts of its promoters—has made quick and easy communication with almost anywhere in the world from virtually anywhere in the UK a reality for anyone who can afford it, and the most recent suggestion is that by 1990 one household in every two will be using cellular telephones. Even for those whose communications aspirations do not stretch beyond the dial telephone, international subscriber dialling is now a novelty. The launch of a new generation of communication satellites, the steady increase in public awareness of the possibility of receiving television signals from satellites via a dish antenna on the rooftop, the widespread awareness post-"Big Bang" that computers around the world now happily talk to one another 24 hours a day, and the general increase in public exposure to electronic high technology of one sort or another, all carry with them the implication that amateur radio activities are somewhat "old hat". The fact that a radio amateur can communicate with the other side of the world is not, in 1986, remotely remarkable.

Why, then, should the Society use its perennially scarce resources in attempts to make a positive public image for amateur radio? There are two main reasons. One is that pressure on radio frequency spectrum space, which has always been high, is nowadays positively enormous: in simple terms, there isn't enough of it and almost everyone wants access to it. Amateur radio cannot now justify its existence in the manner open to it 20 years ago, when it was much more obvious that amateurs were making a constructive and creative contribution to society at large; this is not because amateur radio is intrinsically less creative or constructive but because communication *per se* is—in the media's terms—a non-story. In today's society, radio amateurs at large cannot rely on a favourable public image simply because of their ability to communicate: they must be seen to be doing something socially useful with that ability. Good relations with the media help promote an image of amateur radio which accords with the prevailing values of the 'eighties, and probably the best example of that process in action was the Mexican earthquake and its aftermath. Amateur radio has an unassailable role as a communications system for use when all else has failed, and there is no doubt that licensing authorities throughout the world recognize this.

The other main reason is bound up with the comments in the first paragraph; we live, for better or worse, in a world where the dominant technology is electronic and much of the labour-saving or entertainment equipment in the average household contains its quota of electronic components. Such unlikely items as electronic toasters are proudly marketed as featuring "microchip technology", and one wonders how many transistors or ics the average British family home has within its four walls. The difficulty is that the designers of many of these items seem unaware of the frequently catastrophic effects of radio frequency energy on their products; bearing in mind the large-scale problems experienced by British companies in recruiting engineers experienced in the analogue and radio frequency spheres and the widespread incidence of electromagnetic compatibility problems of one sort or another, the Society is sometimes tempted to believe that the average "design engineer" neither knows nor cares about immunity as a design feature.

As far as the year in review is concerned, the major media-related event was the successful contact with Tony England, W00RE, aboard the space shuttle *Challenger* in July 1985—an event given tragic poignancy by the disaster involving *Challenger* early in 1986. The story was fully covered in the September 1985 issue of the *RSGB News Bulletin*, but it is worth recalling here that both BBC Television News and ITN gave publicity to the contact, and voice-actuality found its way on to many BBC External Service transmissions as well as domestic and local radio. As a result of one feature on a BBC local radio station, RSGB Headquarters is now apparently generally referred to as "Mission Control Potters Bar" in a part of the country not unadjacent to Hadrian's Wall. During the course of the mission the Society itself became a broadcaster twice daily, with special GB2RS news transmissions and post-news nets. These proved to be very popular with a large and regular audience, and were themselves featured in television news items. It was interesting to note that GB2RS' reporting of some aspects of the shuttle mission was noticeably more accurate—and in one instance much faster—than that of BBC and ITN; this may be why at least two professional newsrooms were discovered to be monitoring the GB2RS broadcasts on 3,650kHz later in the mission!

The other area in which amateur radio gained some favourable publicity—unfortunately in very tragic circumstances—was the aftermath of the devastating earthquake in Mexico. Since communication with the area was impossible by any other means, amateur radio came into its own as the major bearer of emergency traffic during relief operations, and its efficiency and speed were remarked on in many elements of the media. One other unfortunate incident during the year in review was the nuclear power station disaster at Chernobyl, and for a time it was thought by some newspaper reporters and broadcasters that amateur radio communications could provide some facts in what proved to be a welter of speculation and anxiety. The Society was asked to provide any assistance it could, although it turned out that no properly authenticated information was, in fact, available. One outcome of the Chernobyl incident was a reminder of the necessity to keep a cool head when faced with camera and microphone and not to assume that the truth of a particular story is necessarily associated with how convincing it sounds. BBC Radio broadcast a voiced piece from a non-UK amateur despite the Society's advice to the contrary; the item later turned out to have a false provenance. In contrast, various other radio broadcasts carried the Society's reservations about that particular element in the story, which were later shown to have been well founded. A happier consequence of Chernobyl was the formation of strong links between the Society's "news and current affairs" staff and several international broadcasters, and an enhancement of the Society's reputation for being able to gather the facts and present them in an intelligible way to the media quickly and accurately.

Apart from the major events, the Society has continued to provide advice and assistance on a fairly regular basis to various elements of the media. We have, for example, provided authentic documents for a television series, advised on sources for equipment to be used in a television feature, commented on a draft script for a radio play, provided some authentic morse for a tv news feature and—on one notable occasion—imitated the sound of the Diplomatic Wireless Services' Piccolo system down the telephone to a no doubt bewildered sound effects operator in Broadcasting House! If only the media would pay as much attention to the problems of spectrum abuse and electromagnetic compatibility as they do to the authenticity of their sound effects...

MEMBERSHIP

As noted in the introductory remarks, membership rose by a small percentage (1.3) from 37,096 to 37,604, at a time when amateur radio seems to be under increasing pressure. This financial year saw the first attempt, at least in recent years, to deliberately seek new members. This

was done in June 1986 by asking members themselves to seek new recruits, not at any price, but those who will be expected to play a full part in the objectives of the work of the Society. The advantage of this direct approach was demonstrated by the fact that over a third of the recruits to the Society in the following two months joined as a result of this effort.

MEMBERSHIP CONTACT AND SERVICES

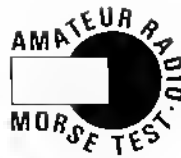
The first line of contact for members needing any of the Society's services is the Membership Services Department. It follows from that bland statement that this department is very busy in dealing with the very large volume of queries from members and those wishing to take up the hobby. The four staff involved divide their intensive working day between the telephone and the visual display units connected to the Society's IBM System/38 minicomputer. Some of the statistics applicable to the department's work during the year in review make interesting reading and point out the scale of its day-to-day work; just over 2,000 applications for special event stations were processed, some 200,000 pages of news and news-sheets were printed, packed and distributed (together with another 4,000-odd pages of the new *VHF/UHF Newsletter* and no less than 36,897 copies of the *DX News Sheet*), 8,877 copies of the GB2RS news script were produced, 77 members were referred to the Planning Panel for assistance with antenna planning problems, and some 15,000 requests for what the department refers to as "standard forms" were received and dealt with. Mailing information for these is produced directly by the System/38, which means that for standardized matters a fast turnover can be maintained.


In recognition of the fact that some attention needed to be paid to the way in which the enormous volume of incoming telephone calls is dealt with, the headquarters telephone system was upgraded in mid-1986 and some changes were made to the procedure for handling calls. This has resulted in a much better response time and greater efficiency. Further "fine tuning" may take place next year. The System/38 software used by the department in its day-to-day work has also been refined and updated in several areas.


The department became responsible for the production of the "Members Ads" section of *Radio Communication* during the year in review, and certain members of its staff became involved in some of the production aspects of the *RSGB News Bulletin*. This has led to a much better turnaround time for members' advertisements, and it occasionally happens that an advertisement appears in *Radio Communication* some two weeks after it was sent in. Four pages are generally allocated for this purpose, although occasionally the volume of incoming advertisements requires that five or even six pages of the *Bulletin* section are utilized. The *Bulletin* itself was also expanded to a regular eight pages (and occasionally more) during the year in review, and the ability to incorporate late news and features seems to have been well received by the membership. It is worth noting that the *Bulletin* is entirely produced in-house, to a tight deadline, and is delivered to the *Radio Communication* printers as camera-ready copy for printing with the rest of the magazine.

Members of the department attended a number of rallies and exhibitions during the year in review, although there is a perennial conflict in this area between cost, staff time and the need for the Society to be represented at events of this nature. Although it would be highly desirable to have a stand at every rally in the calendar, the need to reduce the very high costs of attendance at rallies and exhibitions meant that some considerable heart-searching had to take place during the year in review and a number of invitations had to be declined. It is hoped that next year at least as many events can be attended as in 1985-6, and perhaps a few more.

Headquarters staff continue to regard an important part of their job as visiting clubs and groups up and down the country for "lectures" on the work of the Society. During the year in review some 20 organizations were visited in this way, and the clubs concerned took the opportunity to interrogate the Society in depth about amateur radio matters. Inevitably the "lecture" becomes a lively seminar in which mythology and rumour are demolished and penetrating questions answered in depth; good humour prevails and both lecturer and audience usually leave the meeting wiser than when they came in! It cannot be stressed too strongly that the Society regards feedback from its members as vital to the success of its operations, and values highly the invitations to visit clubs and groups to discuss—literally—anything which is of interest or concern to them. Subject to availability the Society will always endeavour to provide staff to carry out this function, the only limitations being the high degree of pressure on the time of senior staff. As has been said in previous years, it is obviously considerably more cost-effective for one member of staff to be able to lecture to several clubs and groups at once, and club secretaries are invited to discuss the possibility of joining forces with their colleagues in adjacent areas for an "RSGB evening".



 Counties or regions in which there are sufficient examiners to conduct Morse tests.

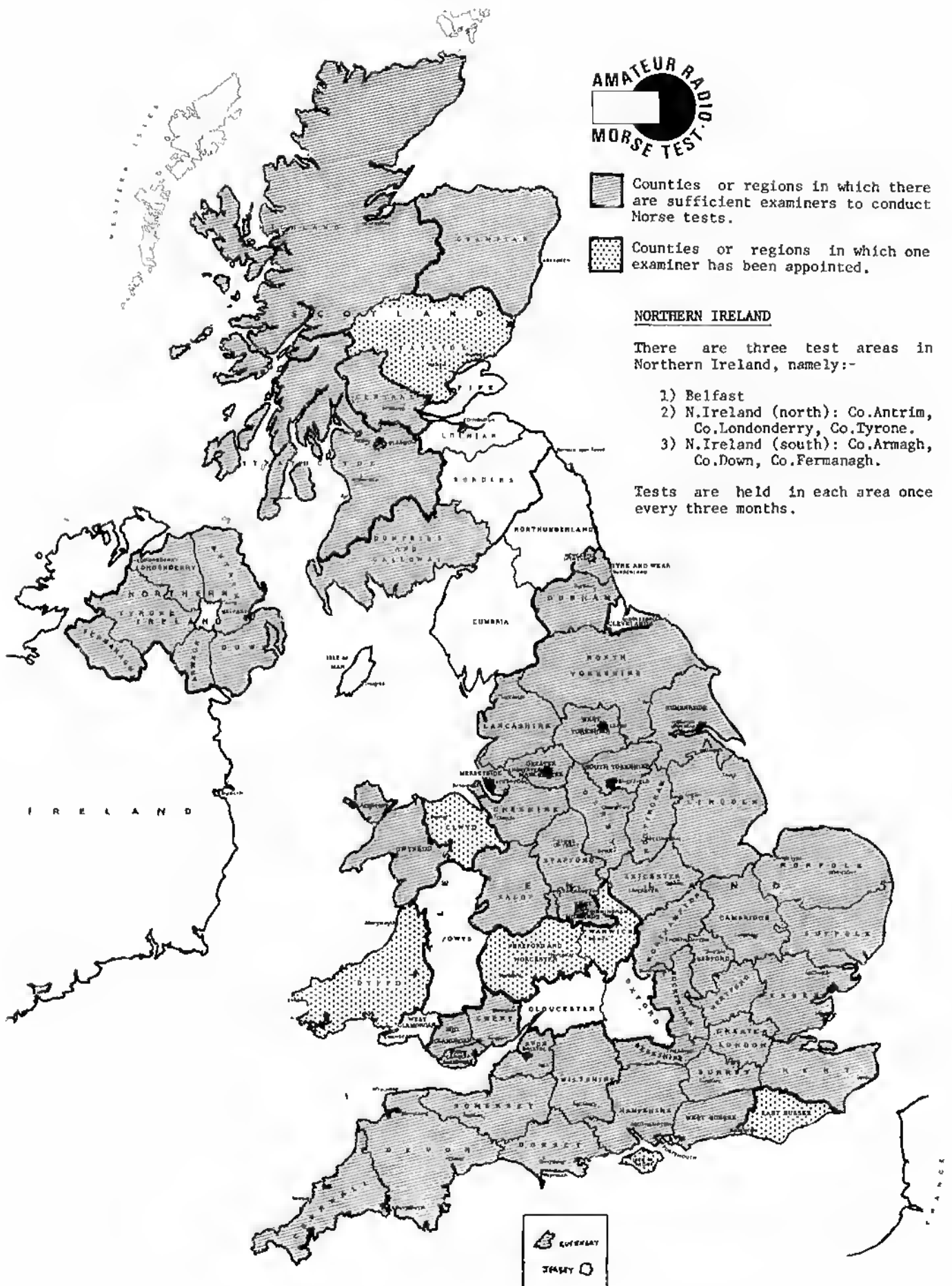
 Counties or regions in which one examiner has been appointed.

NORTHERN IRELAND

There are three test areas in Northern Ireland, namely:-

- 1) Belfast
- 2) N.Ireland (north): Co.Antrim, Co.Londonderry, Co.Tyrone.
- 3) N.Ireland (south): Co.Armagh, Co.Down, Co.Fermanagh.

Tests are held in each area once every three months.



MORSE AND MORSE TESTING

In 1984 the Department of Trade & Industry asked both the Society and the City & Guilds of London Institute to submit tenders to take over morse testing for UK radio amateurs. After due consideration the Society submitted outline proposals to the department in December 1984 and detailed proposals in May 1985. British Telecom International and its predecessors, which had provided the amateur morse testing service for very many years, also submitted proposals for the morse test in the summer of 1985.

In November 1985 the DTI informed the Society that it had been successful in its bid and asked the Society to accept responsibility for morse testing as of 1 April 1986. The Society was pleased to accept, particularly for the following reasons:

- because of the high value it places on morse as a means of communication;
- to make it both more convenient and cheaper for amateurs to take the test; and
- the possibility, at a later date, of putting proposals to the DTI to make the test more effective.

Although the time-scale of 17 weeks in which to set up a comprehensive and complete scheme was short, the Society was convinced that the enthusiasm of those volunteers involved would enable it to be set up reasonably quickly. Its initial target of having set up half the ultimate number of centres within six months was met without difficulty, and by 1 October 1986 it has established examining teams in some 48 areas. The map on page x shows the coverage currently being achieved.

In the taxing work of testing potential examiners and taking on various aspects of the morse test scheme, the Society is indebted to its chief morse examiner, Mr Neville Ianson, G3CDO.

COMMITTEE REPORTS

Education

Committee: G2WS*, G2CVV*, G3HB, G3FVC, G3LCK, G3SZJ, G4FZZ, G6NZ, G8GPH, G13USS, GM8BZX, GW4HWR.

There were five committee meetings during the review period, all being on Saturday mornings.

The lectures "Background to Amateur Radio" given at the Science Museum were very well received, but attendance at those at NEC was low; perhaps here we were preaching to the converted. The committee stand at NEC was manned almost continuously and a great deal of information and guidance was given to many visitors.

A stand, with GB2ASE in operation, at the 1986 convention of the Association for Science Education created a great deal of interest in amateur radio, removing the impression in the minds of many visitors that amateur radio was just another sort of club.

The eleventh edition of the RAE Manual covering the RAE syllabus for 1986-8 was published in October 1985.

Somewhat fewer than usual enquiries concerning the RAE were received by the chairman direct and via HQ during the year. It would perhaps appear that the multiple-choice examination is settling down to a more peaceful existence.

G L Benbow, G3HB, chairman

EMC

Committee: GU3YIZ, G2FLB*, G3AEZ, G3BLE*, G3GVM*, G3UFB, G3VWK*, G3XZB*, G4DXA*, G4FWM*, G4IWS, G4JKS, G4JXO*, G5HD, G8KLH, G8SOZ.

The almost total withdrawal of the DTI, Radio Investigation Service from the amateur scene, with the exception of its enforcement role, has substantially increased the areas of involvement and, consequently the work load of this committee.

Members have attended meetings with the DTI, professional emc seminars, and ad hoc working group meetings at which RSGB policy has been formulated.

Contacts have been sought with senior technical staff employed by manufacturers, rental companies and with BT emc research, in most cases with considerable success. The committee intends to pursue this line with enthusiasm, the accrued information to be available from a data-bank held at HQ.

EMC information stands have been arranged at the Society's events and there has been a full programme of lectures at club meetings.

The committee looks forward to being involved in the proposed research programme aimed at solving the problems experienced when "legal limit" amateur transmitters are operated in areas of dense housing.

L Hawkyard, G5HD, chairman

Exhibition & Rally

Committee: G5HD, G3MVV, G3SZJ, G3TDR, G4HHB.

The committee met 10 times during the year; two meetings were held outside London, at Leicester during the Amateur Radio Exhibition there, and at Sandown Park on the eve of the VHF Convention. It was also involved in those events and at the Woburn Mobile Rally and the NEC RSGB Amateur Radio Convention.

Most time was spent in organizing the NEC Convention at Birmingham. Trade support was very good in spite of the depressed market for amateur radio, particularly from component and secondhand-equipment dealers. However, the attendance over the two days of the convention was down by about 20 per cent on 1985. An evening reception was organized during this convention; and it was very successful with over 200 tickets sold. The reception was honoured by the presence of the presidents of the RSGB and VERON and by representatives of the Belgian and West German radio societies.

The RSGB National Rally at Woburn was again very successful, with an excellent attendance in spite of the cold weather that seems to afflict the rally most years. Over 80 trailers honked tables, and the RSGB stand was the most ambitious yet seen.

The VHF Convention trade exhibition was again organized by the committee. The trade was well represented and the attendance was the highest yet recorded, perhaps due to it being held on a Sunday.

Robin Hewes, G3TDR, secretary

Finance & Staff

Committee: G3FKM, G3COR, GW8HEZ, G3RPE, G4CHH, G6JP, G2AMV, G3VPE, G8VR.

This committee met 10 times during the Society's financial year 1985-6 although two of these occasions represented one meeting "carried over" due to a large agenda. The dominant theme for the year was the need to monitor expenditure so as to reverse the state of deficit experienced at the end of the two preceding years. At the time of writing, there are early indications that these efforts have met with a modicum of success.

Good progress was made regarding the establishment of a Trust to accept donations and legacies intended to assist those considered to be in need and worthy of help. Unfortunately the last stage of this project is held up awaiting action by solicitors. Following a surprisingly high professional estimate for the provision at HQ of a Presidents name board, the committee took on the project and a member of the committee did the woodwork and individual plaques were engraved for each name. The result may be seen in the hall at Lambra House. It was paid for by a donation from Mrs Jane Balestrini, widow of the late Peter Balestrini, G3BPT, the Society's 1980 President.

Much time was spent discussing the subject of waived and reduced subscriptions. To qualify for the latter, senior citizens who ask the Society for this financial support need to have been members for at least five years. In recent years, popular demand prompted Council to reduce that period from the former 15 years. The large number now applying and the consequent reduction in the Society's income indicates a need for the Council to reconsider the arrangements during the 1986-7 financial year.

The present financial climate has necessitated the committee keeping a closer watch than in recent years on a number of matters. These include debtor accounts, the level of advertising in *Radio Communication*, membership statistics, book sales etc. These and other items are closely associated with the RSGB's financial health and obviously merit closer scrutiny than was the case during what might be called the "boom years".

Compared with the Society's other committees this one has the least to do with the operation and enjoyment of amateur radio but has the heavy responsibility of trying to make sure that the Society's income is used to the best advantage for the membership generally. With a hobby that has so many different facets, increasing yearly with the advance of technology, this is a very difficult task.

B O'Brien, G2AMV, chairman

HF

Committee: GW4BKG*, G3AAE, G3DME*, G3FKM, G3GIQ, G3GJW*, G3GVV*, G3HCT, G3KDB*, G3KMA, G3VYY, G3XTT, G3ZAY, G4BUO, G4DYO*, G4FAM, G6LX*, RS25429*.

The 1985 HF Convention was held on 29 September at the Belfry Hotel near Oxford, and with over 450 attendees was a great success. At the time

of writing, arrangements are well in hand for the 1986 event which for the first time will include a supervised assembly area for simple receiver kits.

Five papers were prepared for the 1987 IARU Region 1 Conference, covering: a proposed 1.8MHz band plan (prepared after extensive consultation with band users); the adequacy of the RST reporting system; the impossibility of certifying log extracts as true records for awards purposes, and 29MHz fm repeaters (arguing the need for experiments but proposing that such repeaters should be closed down well before the next sunspot maximum).

The terms of a limited 29MHz repeater experiment (three repeaters on a single channel pair for no more than one year) were agreed with the Repeater Management Group and the proposal has now been submitted to the DTI.

Other work during the year included the development of detailed terms of reference for a dxpedition fund, recommendations to HQ on the production, charging, and marketing aspects of the *DX News Sheet*, liaison with printers over the new awards certificates, preparation of comments to the US Federal Communications Commission on the ARRL's plans to expand the 28MHz novice allocation into the beacon sub-band, preparation of a cw training tape, and promotion of advanced cw skills through competitions at the HF Convention and NEC.

The committee's work programme for 1986-7 includes a review of hf band plans and publications, and the chairman would be pleased to receive correspondence from members on these or other hf matters. A major emphasis will be placed on increasing the attractiveness of hf amateur radio to young people, and comments or offers of assistance in this area will also be most welcome.

M J Atherton, G3ZAY, chairman

HF Contests

Committee: G3FKM, G3HCT, G3KDB, G3SJJ, G3SXW, G3TXF, G4BUO, G4DJX, G4RWW, G6LX, RS20249, RS32525, G3KKQ*, G3OZF*, G3RJV*, G3XDY*, G3ZAY*, G4JKS*, G6AGE*.

The committee is responsible to Council for all aspects of the Society's hf contests. Once again there has been a steady increase in the number of entrants to our events, and during the year under review it was necessary for various members of the committee to meet a number of times at members' homes to adjudicate contests. This was in addition to the 11 committee meetings.

The committee shared a stand with the HF Committee and were in attendance at the HF Convention as well as other functions and meetings to answer members' questions on contest matters.

The committee maintains direct links with other RSGB committees via cross-membership, and has a good working relationship with the contest committees of IARU Region 1 and other overseas societies. As a result of joint efforts by RSGB, DARC and USKA, the IARU proposal for a multi-mode field-day was further reviewed by the Region 1 hf managers at their March meeting in Vienna. The original multi-mode concept has been dropped in favour of a cw fd and this will be recommended for adoption at the forthcoming IARU Region 1 conference in 1987. The HFCC is directly concerned with other contest representatives in formulating the rules for this event.

The AFS and NFD contests remain very popular with clubs and groups, and the 7MHz, 21/28MHz and 21MHz events continue to attract wide individual support from members. The smaller specialist contests and the short mid-week cumulative activity competitions are well liked and extra sessions have been added at members' request.

The golden jubilee of the original BERU (now Commonwealth) Contest occurs in 1987, and the committee is planning to mark this anniversary, the Society's longest-running contest, with special awards and other features.

The committee membership has remained unchanged during the year, and the chairman thanks all the members for their efforts and for giving up so much of their leisure time. A word of thanks is also due to our corresponding members whose specialist knowledge is of great assistance.

Ron Glaisher, G6LX, chairman

IARU

Committee: G3FKM, G3ZNU, G3ZAY, G3BYW, G3RPE, G3WSN, G6LX, G3GVV, G4IQQ, G4KGC, G3PSM, G5XB*, G3DME*.

Minutes secretary: Ms H M Norman. The main task of the committee, which met four times during the period under review, has been the preparation and consideration of papers for the 1987 IARU Region 1 Conference. This has involved the examination of synopses and the approval of the final versions of these papers, which in turn has meant interaction with almost all of the RSGB committees.

Associated with the above was the submission of papers for the Region 3 Conference 1985, dealing with topics throughout the frequency spectrum, and with proposed amendments to the IARU Constitution and

Bye-laws. The Region 3 Conference was attended by G3GVV (who chaired a working party dealing with the above paper), and by G3OUF (who was appointed convener of the Editorial Committee).

The IARU Committee was honoured by the attendance, at its January meeting, of Mr M S D Shadid, president of the Bangladesh Amateur Radio League. Temporarily resident in the UK, Mr Shadid (who holds the callsign, G1NW1) described the problems at present facing his society, in particular the inability to obtain licences.

All the spectrum managers attended the managers' meeting in Vienna, together with G3ZAY and G6LX.

Council approval for reviving the Intruder Watch System is awaited.

Several members of the committee spoke about its work, and the function of IARU, at meetings of clubs and affiliated societies.

R J Hughes, G3GVV, chairman

Licensing Advisory

Committee: G3FKM, G3RPE, G3STC, G3WSN, G3XDV, G3YGF, G3ZNU, G4DMP, G4FJN.

The main work of this committee involves liaising with the DTI to maintain and improve the facilities available in the amateur licence. In August last year, David Pratt retired from the post of chairman and John Bazley retired from the committee. Many thanks are due to them for the effort they have put in on our behalf in the past. Mike Dennison, chairman of the Repeater Management Group, joined the committee this year to improve the links with the DTI on repeater matters.

It has been a very busy year, with a steadily increasing workload. The major achievements of the year were the granting of an allocation at 50MHz for Class A licensees, and the morse for Class Bs experiment becoming a permanent feature of the B licence. Although the Society was unable to obtain access to 50MHz by both classes of licence from the outset, we believe that there is a good chance that it may be made available to Class Bs when the experiment is reviewed after the first year. The action of the DTI in granting this allocation has already aroused considerable interest in several European countries, and we hope the effect will snowball and allocations will begin to appear in other countries. The ability for Class B licensees to practice and use morse on the air will give them an excellent opportunity to sample the benefits of the mode under realistic conditions, and will greatly assist them in obtaining a Class A licence. It is an excellent example of the self-training aspect of amateur radio.

Some of the other achievements this year include: publication of guidelines for crossband operation; greetings message facilities for special event stations with the USA, Canada and the Falklands—the DTI made special efforts to make this available in time for JOTA; the DTI awarded the RSGB the contract for carrying out morse testing; agreement of new procedures for reporting spectrum abuse to the DTI; the DTI has agreed to carry out a review of repeater and beacon licensing procedures to reduce the delays and clear the backlog; the fees for the amateur licence have remained unchanged while those for other radio licences went up by hundreds of per cent.

Some subjects in the final stages of discussion which should be finalized in the next few months include: licensing of packet radio repeaters and the resumption of the issuing of special research permits. Slow progress is being made towards an agreement within CEPT countries which should greatly reduce the need for reciprocal licences. The advent of computers and data modes in amateur radio has raised a number of interesting licensing issues which will be taken into account in the licence revision.

Other events have occurred which may have a big impact on the future of the hobby. Changes within the RIS have resulted in a reduction of effort available for investigating complaints of interference, and their new procedures have forced us to devote a considerable amount of time to this matter. Some progress has been made, and work is still continuing. The DTI has also called in a firm of consultants to examine the methods by which the spectrum is allocated, in particular whether it can be performed on the basis of market forces. We hope there will be no major impact on our bands, but await their report with interest.

These events and the many other day-to-day problems that crop up have regrettably meant that the work on the licence revision and many of our other projects has been delayed. This, together with the RIS and emc problem will be priority topics for the next year.

J N Gannaway, G3YGF, chairman

Microwave

Committee: G3PFR, G8AGN, G3PHO, G3RPE, G4DDK, G3YGF, G4FRE, G3JVL, G3WDC, G4KGC, G3JHM*, G4FSG*, G4KNZ/ ZL2AZQ*, G3RWL*.

This year, because of necessary budgetary restraints, fewer than usual meetings have been held and much of the routine business of the

committee has been conducted by correspondence or telephone. Latterly, some members of the committee have had success in communicating committee business files using telephone modem links, a method which seems to have considerable potential in saving time and stationery/postal costs!

These combined tactics have enabled the committee to stay close to budget while still allowing its members to actively support more Society-sponsored events. Among the latter have been the Sandown VHF Convention, the NEC National Convention, the Midlands VHF Convention and several round tables (by courtesy of the respective establishments and local organizers) at Sheffield, Winchester and Martlesham.

The other general work of the committee has included liaison with the Licensing Advisory Committee (frequency allocations, usage and licensing conditions), the VHF Contests Committee (microwave contests), and the Repeater Management Group (microwave-based beacon/repeater projects), beacon planning/approval, running the Microwave Newsfetter and the components service (in conjunction with HQ), and the "Microwaves" feature in *Radio Communication*.

One notable achievement—the result of combined efforts by this committee and others (particularly LAC and HQ)—has been the incorporation into the licence schedule of the Class B morse facility and its extension to portable operating. This should do much to improve microwave communication, particularly on the higher bands when portable.

Liaison with the RMG and the beacon planning/approval aspects have been made singularly difficult by licensing delays experienced with DTI. It is believed that these difficulties will be resolved in 1986–7 by improved liaison, streamlining of procedures and this committee's intention to set up a more formal link into the RMG by approval of a liaising member from that committee.

There have been three main special topics this year, most of which will spill over into 1986–7. The first has been the preparation for the IARU Region 1 triennial conference to be held in Holland in March 1987; this has involved the preparation of several papers for the conference. A particularly important aspect has been to determine and define the microwave allocations within Region 1 countries, with a view to co-ordinating more rational band planning under increasing pressure from professional users. Additionally, the committee has prepared a paper for submission to the Defence Radio Frequency Spectrum Review, Stage 1 (470MHz to 3.4GHz). This review was set up following the recommendations of the earlier Merriman Report. It can be seen, therefore, that the accent has been heavily on frequency allocation and usage.

The second topic which has occupied much of the members' time over the past two years, is the compiling and writing of a *Microwave Manual*. This has been a major undertaking and publication is expected by the end of 1986 or shortly after. Thereafter, work will continue to update the manual as amateur microwave techniques develop and expand to embrace the newer technology available.

Thirdly, the committee is determined to support UK design and construction of amateur equipment of an advanced nature, and to this end is reinstituting the John Rouse Memorial Trophy, which will be awarded in late 1987, for the best design of equipment for 3.4GHz or above submitted to the committee. The components service has been carefully expanded in order to support this project.

Objectives for 1986–7. As well as discharging the normal routine business, the committee will continue to direct its efforts to promoting all aspects of microwave operating, design, techniques and standards. Steady but careful expansion of both the *Newsfetter* and components service is planned, and the committee intends to continue its support at major exhibitions and round tables. It is hoped that affiliated clubs and societies will make more use of the committee as a focal point for their microwave interests; members are usually available to provide information and lectures/demonstrations at the local level.

During 1986–7 the committee is particularly keen to promote narrowband activity on any band, particularly 3.4GHz and up, and any activity (wide or narrowband) at 24GHz. The foundations for such promotion have already been laid, both in the constructional competition and by the extended range of components available through the components service.

M W Dixon, G3PFR, chairman

Propagation Studies

Committee: G2AHU*, G2FKZ, G3BYW, G3DME, G3GVV*, G3HTF, G3JVL, G3LTP, G3USF*, G4AQI, G4CEB*, RS87676, DJ5DT*, F8SH*

Another busy year, providing us with further links with outside bodies, including liaison with Marconi Research, which has led to the inclusion of

ionospheric reports and forecasts in the RSGB DataBox service, and closer ties with the Rutherford Appleton Laboratory, leading to the setting up of the 28MHz experimental station GB3RAL at Slough. A paper on tropospheric propagation was presented at the IERE Conference on Receivers and Associated Systems at Bangor in June, and references to some earlier related work is to appear in the next edition of one of the CCIR "green books". Two tape/slide lectures, one on aurora and one on solar cycle 21 have been deposited in the Society's library ready for loan to clubs and groups.

Of recent months our ionospheric predictions in *Radio Communication* have suffered seriously from a lack of space and the format was changed to provide a different aspect ratio. This proved very unpopular with users and a return to the old style, but with the inclusion of our new bands, has been adopted, although its legibility at present leaves much to be desired.

The new 50MHz band has provided some useful material for propagation studies and we are co-operating with our professional colleagues in trying to establish the mode (or modes) which have provided the openings to northern South America and the USA. Members of the committee manned a stand at the HF and VHF conventions and at the National Amateur Radio Convention in Birmingham, at which G2FKZ provided one of the lectures.

Routine work of the committee continues, and we would like to take this opportunity of thanking all the readers who have helped us by contributing logs and other material in connection with our studies.

R G Flavell, G3LTP, chairman

Raynet

Committee: G3KWU, G3STG, G3TJP, G3VPE, G3YAC, G4FLQ, G4KAR, G8CAC, G3FKM, G3RPE, G3WSN, G8VYX*, G4BCP*, G3KWT*, G4TWT*, G4AAV*, G4ETN*, G4YKL*, G4IWA*, G4MWO*, G14NKD*, G3RFA*

The work of the committee has continued throughout the year consolidating and developing the work of the network. Membership of Raynet has grown steadily throughout the period under review, rising by approximately 10 per cent.

Undoubtedly the busiest period for many members during the year occurred in the autumn when they contributed to welfare traffic and relief surrounding the Mexico City earthquake disaster. During this period, over 1,000 enquiries from distraught relatives and friends were received and dealt with, many coming from non-British nationals living in the UK who had no source of information other than that provided by radio amateurs. Excellent co-operation was received from the Foreign Office, Department of Trade & Industry and the International Welfare section of the British Red Cross Society, and much was learned from this highly unusual call upon the network.

Many lessons were also learned from the very demanding operations mounted in support of safety cover for the RAC/Lombard Rally during the year. Many portable stations were set up across England and Wales, passing traffic to the national co-ordinating station established in Nottinghamshire, and again many valuable lessons were learned about operating in a wide variety of modes under these conditions.

The administration of membership records at RSGB HQ has continued and has been further streamlined, and the support of headquarters staff in this area is gratefully acknowledged.

After serving Raynet for many years in many capacities, but for the last 17 years as Raynet supplies officer, Jane Balestrini decided to retire from her work for the committee, and tribute must be paid to her extraordinary efforts and never-failing helpfulness to all members during that period.

The year saw a greater reported level of activity by groups than ever before, with much use being made of the various changes in licensing regulations made in the past 12 months. The strength of Raynet was improved within many counties and cities by the formation of additional operational groups and co-operation and communication between groups was considerably strengthened. Members have welcomed the wider circulation of *Zonews*—a volunteer produced and funded newsletter originally destined for zonal representatives only, which has proved a valuable source of news of the work of other members as well as acting as a forum for discussion. The 3.5MHz net has also continued to serve the needs of groups throughout the UK, and its weekly operation provides up-to-the-minute news and exchange of information.

The need for the provision of more assistance for groups in supporting information and training material was recognized during the year and various measures put in hand to strengthen their availability.

Once more the work of all zonal representatives made continuing development of the network possible, and the thanks of the committee go to all those who are continuing and retiring.

G A Griffiths, G3STG, chairman

Repeater Management Group

Committee: G3ZNU*, GM8LBC, G3XDV, G3PFR*, G4AFJ, G4MQS, G3WSN*, G6LMR, G8MFP, G4EFO, G3VZV, G4DAX, G8IMB, G4CCC.

Repeater regional representatives: G3LEQ, G0COA, G8HVV, G3UQH, GM3UKG, G3GHS, G1GNS, G3T2M, G2SP, G8GTZ, GM8BDX, G8JNZ, G6AWT, G8FWY, G4HSY, G0BEQ, G8UCY.

In order to spread workloads and to improve communication with repeater groups, 17 regional corresponding members were elected, and in most cases this has proved useful. Additionally, three full committee members were recruited—G4DAX for closer liaison with Council, G8IMB to deal with data repeaters, especially packet data, and G4MQS to progress special experimental repeater projects.

Among the many achievements during the year were agreeing specifications for rty and data repeaters, drafting papers for the 1987 IARU Conference in conjunction with the vhf manager, completing proposals for three experimental 29MHz repeaters and for adding 10GHz receivers to three 433MHz units, inaugurating an experimental service reading the GB2RS news from some repeater transmitters, resurrecting *Repeater Report*, the newsletter for repeater groups, and resolving the GB3GD/GB3VT co-channel interference by a four-way channel change which resolved two other cases of interference at the same time. A number of proposals for inter-linking repeaters were discussed and specifications drafted for three types of linking aimed at making repeaters more flexible, especially in remote areas. The RMG took on all of the Society's work on packet data and, via the Licensing Advisory Committee, negotiated with the DTI for an experimental data repeater network. A number of packet repeater proposals were dealt with.

Nineteen repeater proposals, including five atv and six site changes, were sent to the DTI but no licences were issued during the year. Licensing delays, often exceeding a year, were of great concern to the committee, and representations were made to the DTI via the LAC. Licensing times of this order are a considerable barrier to useful experimentation, so the RMG is continuing to press for a less rigid and bureaucratic system.

The routine work of the RMG occupied, as usual, a large proportion of available time and effort. Broadly, this involved giving repeater groups support, encouragement, advice, and the occasional nudge, in order to maintain a high standard of service throughout the network. The sterling work done by repeater groups throughout the country is much appreciated by the committee.

M Dennison, G3XDV, chairman

Technical & Publications

Committee: G3RZP, G3RPE, G4FAW, G3YGF, G3SJX, G4GYO, G4BWE, G4SWX, G8ONH, A W Hutchinson (editor)†, Ms H M Norman (minutes secretary)†.

The principal function of this committee is to ensure that the content of all RSGB publications is technically accurate.

During the year we lost the sterling services of G4FAW, who resigned due to pressure of work, and of G3RPE's chairmanship at the end of the year following a change in circumstance. We were joined by G4BWE and G3RZP, whom Council appointed as next year's chairman. Some aspects of amateur radio are still under-represented on the Committee, and new members are being sought to cover areas such as visual communications, antennas, power supplies and communication using the extremes of the frequency spectrum.

Most of the committee's resources were devoted to the review of potential articles for *Radio Communication*. Ways of altering the structure and format of the magazine are always under review. A new reviewing procedure has been introduced that, hopefully, will reduce the review turn-round time for most manuscripts to less than five weeks. Simultaneously, a new data bank compatible review form has been devised. It is envisaged that this will allow greater control of the technical balance of *Radio Communication* and prevent a dearth of articles on some topics.

The technical content of *Radio Communication* is dictated only by the articles received. If your interests are not being represented, then one way to do something about it is to write an article! We would like to see more short articles, some less technical articles and, particularly, more general interest articles. For example, topics such as operating, expeditions, an introduction to "... and, possibly, the occasional spoof for the April issue.

Progress has been made towards rectifying the situation with regard to the lack of articles for the newcomer: the committee has commissioned the design of a beginner's receiver. It is intended that, on publication next year, a complete kit of parts will be available from the RSGB, and that this will be the first of a series of such projects.

The continuing receipt of high-quality articles for *Radio Communication* and the number of books in production suggests that there is still a keen interest in the technical aspects of amateur radio.

G Humpston, G4GYO, vice-chairman

VHF

Committee: G3ZNU, G3COJ, G3UBX, G4ASR, G3XDV*, G3PFR*, G3WSN, G8GOJ*, G3GVV*, G5UM*, G4KAR*, G3RWL*, G3OSS, GM4ANB, G3XDY*, G3VZV*, G3FZL, G3RKL*, G8VR, G3UUT*, G4CCC.

During the year G3UBX and G3OSS joined the committee as full members. G5KW (corresponding member for 50MHz) left the committee after several years of dedicated effort towards 50MHz goals.

A highlight of the year was the granting by the DTI of the 50MHz band to all UK Class A amateurs. The smaller (500kHz) allocation meant that the band plan had to be revised, and the restrictions on power meant an awareness had to be created of the equipment and antennas needed. The committee adopted 50MHz as its theme for the year with the aim of promoting the band and the proper use of power.

In March the IARU Region 1 vhf managers' meeting was held in Vienna, and was attended by G3WSN. This meeting acts as a forum for discussion of topics in preparation for the triennial Region 1 Conference, due to be held in 1987. Papers for the conference have been prepared by the committee, covering such topics as random meteor scatter frequencies and timing, band planning, repeaters, and operating conditions for difficult tropo contacts.

The VHF Convention continues to be highly successful. This year's event was held on a Sunday for the first time, and the change of day did not appear to affect attendance, although it was appreciated that those travelling from some distance found it impossible to attend. The committee also participated in the National Convention at the NEC with a committee stand and lectures. For the first time the committee participated in the Midlands VHF Convention (now an RSGB event), a smaller, more specialist event by comparison with the national ones. This involvement will continue in the future.

The committee embarked upon two studies during the year. Syled's continues to be a problem in the 432MHz band, and the committee is currently investigating the technical aspects with a view to finding methods of reducing its effect on amateurs. The second study is into the feasibility of adopting a full 12.5kHz channel spacing standard for fm in the 144MHz band. This extensive study will cover aspects of equipment compatibility and user resistance, as well as looking at potential capacity increases.

This report would not be complete without thanking the many volunteers who help in the work of the committee, both behind the scenes and "up front", without whom the chairman's job would be impossible!

Malcolm Appleby, G3ZNU, chairman

VHF Contests

Committee: G3XDY, G4JLG, G3LCH, G4NBS, GM8MJV, G3FZL, G8TFI, G4FRE, G2HIF*, G6LX*, G3ZNU*, G3WDG*, BR532525*.

The committee was pleased to see an increase in entries for vhf contests during the year. The new style VHF Affiliated Societies Contest held in conjunction with the December 144MHz Fixed Station event was a great success, and it is anticipated that even more stations will take part in the 1986 event. Increased emphasis has been put on 2.3GHz this year, with the 1.3GHz Cumulative Contests extended to include this band, and the experimental inclusion of 2.3GHz in the VHF NFD. Although many stations took part on 2.3GHz in VHF NFD, it may be that its inclusion strains the resources of many groups.

So far no events have been organized for 50MHz in view of the restrictions imposed on portable operation. The committee will reconsider the situation if the regulations are relaxed in future.

A county/country multiplier system has been extended to more events, with favourable results, and seems preferable to schemes based on locator squares. The basic distance-related scoring system works well and is widely understood, but there have been instances of poorly-written computer scoring programs giving inaccurate results. The IARU locator system still attracts some comment, but in fact there are notably fewer errors in logging than with the old QTH locator.

Thanks to the efforts of the RSGB trophies manager, G4JKS, the winners of the trophies were able to retain them after the presentations at the VHF Convention. The committee held a forum for contestants to air their views at this event, which gave useful feedback for organizing future events.

John Quarmby, G3XDY, chairman

*Corresponding members

†Staff member

REPORTS FROM THE . . .

. . . Amateur Radio Observation Service Organizer

This advisory service has continued to investigate and process a variety of reports about alleged spectrum abuse and licence infringements within the amateur bands. Some serious, many short-term and easily settled, and others resulting from personal clashes which usually cease when the parties involved realize that tolerance and friendly co-operation must prevail. A large proportion of these have been disputes about the rights to operate on channels listed in the band plans for particular modes and activities.

Repeaters continue to be the favourite medium for deliberate, anonymous and often unpleasant interference. A number of offenders have been located and identified, and some prosecutions have resulted. The AROS has been able to advise the best procedures and can accept reports for further action, but often it is the local group which can best identify and locate such transmissions, and to some extent find a satisfactory solution.

Unfortunately, on all bands there are a number of people, whether licensed or not, who need to be identified and dealt with, as they bring the amateur service into disrepute. Many of those who regularly and deliberately interfere with law-abiding operators can be identified by those who hear them, but these operators are often unwilling to name names in fear of reprisals. The co-ordinator of the AROS receives reports in complete confidence, and does not disclose information sources without the permission of the originator.

There have of course been the usual number of frivolous complaints or those based on personal grievances, but they are normally eliminated after preliminary investigation.

The use and misuse of regular nets, serious or chat, have often developed into open argument about spectrum occupation. However, there are published guidelines, at least for IARU Region 1 which, if read by net users, should reduce the problem. The matter of channels being held open, awaiting use, has been objected to, and the ruling is that such action would only be acceptable on frequencies specially designated for a specific emergency.

Unlicensed, or "pirate" transmissions continue to be a widespread problem, but to trace, identify and obtain the necessary proof which will stand up in court requires the use of resources which are already overstretched.

A closer co-operation and understanding between the Department of Trade & Industry's Radio Regulatory Division, and especially the Radio Investigation Service, and the RSGB, has resulted in the adoption of procedures for reporting instances of serious spectrum abuse, and ensuring that thereafter those responsible are dealt with effectively. The co-ordinator of the AROS will be able to originate correct proforma reports and channel them to a conclusion.

R J Osborne, G4FIN

. . . Audio/Visual Library co-ordinator

The A/V Library has been well-supported as usual during the past year with emphasis on the autumn and winter months. But the quality of some of the older cassettes—those which have been in circulation for years—unfortunately leaves much to be desired and is the main cause of complaints. For this reason, 16mm films were withdrawn from the library. Another disappointment to clubs are titles which have not been updated, eg *Satellite Communications* (1979) and *Microwaves* (1979), although in fairness such updating relies on the generosity of individuals. The last recorded history of the RSGB was made on a tape in 1964! Should Council now consider commissioning the making of a video cassette to show the amateur radio world its activities, involvements and achievements?

To compensate slightly, however, some new titles had been added to the list, which includes *Solar Cycle 21* (tape/slides) and *VU7 DXpedition* (video). Any cassette donations to the A/V Library from private, commercial or club sources would be extremely welcome.

Finally, book early and avoid disappointment!

R G Auckland, G2PA

. . . HF manager

During the period under review I attended the meeting of hf managers which took place in Vienna in March 1986. From the Society's point of view, probably the most important matter discussed was NFD. An apparently satisfactory compromise was reached whereby the RSGB

national event becomes an IARU fixture and the autumn ssb contest drops its IARU sponsorship and becomes a national event. The presence of packet radio on hf is an increasing reality, and discussion is taking place on suitable band segments for its use—with some disagreement being obvious. IARU Region 1 hf managers agreed that the rtty band segments were the correct areas, but many users feel that their signals are more compatible with phone. 1.8MHz band plans have been drawn up on a temporary basis and are very similar to those agreed by the ARRL for use in the USA.

Several groups of members expressed interest in repeaters on 29MHz fm. This posed some problems, as the last regional conference had really not agreed that they were desirable. The matter was again put to this meeting, and as a result the RSGB will be conducting a one-year experiment with three units.

A matter which caused much discussion was an application by the ARRL to the FCC to allow a new band for US Novice operators on 28MHz. This would cover the segment at present allocated to beacons in our region. After much soul-searching, the Society felt obliged to lodge comments opposing the proposal, but not without creating some most-regretted ill-feeling between the two societies.

I was also privileged to be present at the Region 3 Conference in November 1985. This gave me the opportunity to discuss matters of common interest with representatives of NZART, WIA and other societies in that region. Some hf band plans were proposed which follow very closely those already in use in Region 1. Interesting papers were produced by Papua New Guinea and New Zealand concerning the possible disadvantages to the amateur service of some expeditions to places where amateur radio is as yet undeveloped.

The monitoring system on the hf bands has been in a state of limbo, but towards the end of the period there were signs that the present members of Council have accepted the fact that this activity matters. As hf manager I would like to give my personal thanks to all those who have devoted much time to this matter in the past but who have been rather overlooked recently, and ask them not to give up as they really are needed. Not all intruders can be moved but many intrusions are accidental and these can be dealt with.

John Allaway, G3FKM

. . . HF awards manager

During the past year the numbers of hf certificates issued showed a disappointing down-turn over previous years, and in particular the certificates issued to our own membership fell by some 20 per cent. This is surprising, considering the number of new licences issued.

In my report last year I advised of a new awards programme, but this has yet to be fully augmented due to problems of design and printing of the new certificates. However, I am pleased to report the following Supreme Class 5 Band Commonwealth Century Club Award has been issued: No 1 —J E Bright, G3TJW.

Also during the review period, the following have been issued: Commonwealth Century Club Awards' No 1—G G Timbrell, G4STH; No 2—J D Kay G3AAE.

Further information on the new awards programme will be published in *Radio Communication* when the certificates are available.

	G	Europe	North America	South America	Asia	Africa	Oceania	Total
WBC	24	113	2	3	44	1	23	210
COXC	3	9	3	-	3	-	-	18
IARU	71	117	2	7	22	3	35	257
DXLCA	2	40	-	-	8	-	1	51
BCRTA	10	65	1	4	13	-	2	95
BCRRA	1	31	-	-	6	-	-	38
WAC	53	-	-	-	-	-	-	53
28MHz Councils	2	-	-	-	-	-	-	2
Totals	166	375	8	14	96	4	61	724

With reference to the above table, it is interesting to note that the IARU Region 1 Award is still the most popular, and we are pleased to report that there are no plans to discontinue this award.

The most certificates issued to any country in the year was 270 to the USSR, and surprisingly a total of 57 certificates were issued to Indonesia.

Finally, may I remind applicants of the address for hf awards and queries is PO Box 73, Lichfield, Staffordshire WS13 6UJ. Always send a stamped, self-addressed envelope, and proof of RSGB membership.

P Miles, G3KDB

... QSL Bureau manager

The bureau continues to be one of the most widely-used services provided by the Society. Midway during the year under review both parcel and printed-paper postal rates increased by more than the official inflation rate; nevertheless, we were able to maintain a satisfactory standard by means of certain economies.

The number of cards passing through the bureau was just over 2,400,000, a very slight increase over the previous year. Of these, 1.5 million were for British amateurs, the balance going overseas; these proportions being similar to those during 1984-5.

Unfortunately much of the Society's resources are being wasted because between 30 and 40 per cent of the cards are not collected; this percentage probably being exceeded in those countries which do not deliver to non-members of their national society. We cannot, therefore, over-emphasise the importance of using the bureau wisely and not sending cards indiscriminately. Perhaps the whole process should be reviewed in the same way, as the technical state of the art has altered over the years. Surely the "100 per cent QSL" syndrome should now be considered unrealistic, together with the sending of cards in respect of contest QSOs and those made through repeaters. Many swl cards hardly fall within our terms of reference, either.

Many members fail to observe the few simple guidelines published in help the system run smoothly. Not sorting outgoing cards delays not only their own but those of everyone else, and the use of oversize cards ensures that they will arrive creased or folded—the IARU recommendation is 5.5 by 3.5 in.

Finally may I express thanks to all our helpers, to HQ staff for their assistance, and of course to the many members who have sent notes of appreciation.

E G Allen, G3DRN

... Trophies manager

This year has seen a change in policy regarding trophies, with a return to the system of retention for one year by the winners. All trophies are now boxed in wooden containers, and all records are up to date, computerized and stored on disc.

The Society has a new addition to its trophy collection—the G3XTJ Memorial Trophy—which was presented by the friends of Ed Hodson and is awarded for the most correct log received in Ropoco 2.

The only disappointing aspect of the year was that no information was forthcoming as to the whereabouts of the Milne Trophy, missing for several years. Consequently a replacement trophy has therefore been purchased by the Society.

If the system of retention is to work successfully, a great deal depends on the prompt return of the trophies by the recipients on or before the date specified by the Society.

Hilary Claytonsmith G4JKS

... VHF manager

During the last 12 months we have seen a number of important changes which have affected the vhf bands. One of the most pleasing must be the introduction of the 50MHz band to the amateur service, despite the rather stringent restrictions. It is hoped that we will be able to extend this most interesting allocation to include Class B licensees, and also to relax some of the other limitations to which we are bound at present. There can also be no doubt that the use of cw by the Class B licensee has proved a great success, this facility being granted on a permanent basis from May. Congratulations must go to all those Class B licensees who participated (and indeed benefitted from the experiment) for the manner in which they operated during the initial experimental period.

This year saw the vhf managers conference held in Vienna, where numerous topics were debated at length. It is at meetings such as these that the Society is able to put forward ideas or opinions to seek reaction from our neighbours. It is through the work of the IARU that much of the co-operation is founded to enable band plans and other items to work for the benefit of all users of our allocations. One of the major concerns throughout IARU Region 1 is the fragmentation of our common allocations by administrations. We have to face up to the fact that our allocations are not sacred, and that the demand is increasing from all sources for more spectrum. It is only by efficient use of our bands, and by educating those administrations throughout Region 1 who remain very much unaware of the use we make of our vhf and uhf allocations, that we can strive to retain that most important factor, the common allocation for all countries.

The Society has always been favoured by being involved in the most up-to-date technological advances, while retaining many of those which are more dated yet equally important. It is pleasing to note that we were able to have very lengthy discussions in Vienna on packet radio. These talks

included the principles, operation and setting up of networks, and also the implications to the amateur service from such activities. Because there are so many unknown factors—both in terms of procedures and requirements from the amateur viewpoint—the Society is hoping to introduce a limited experiment on the 144MHz band in an attempt to evaluate the viability of a much larger network in the future. It is hoped that you will all welcome this experiment in due time and that those of you who are able to participate will forward your comments to me, or to the VHF Committee.

Much work has been done in preparation for next year's Region 1 Conference, to be held in Holland. Many decisions will be made which it is hoped will improve the well-being of the amateur service throughout Region 1 and indeed the world.

Finally, I must thank all the members of the VHF, VHF Contests, RMG, and other committees of the Society, and the HQ staff, for all the work and dedication given to enable our hobby to continue to thrive and advance in the way we have seen during this most interesting year.

K A M Fisher, G3WSN

... VHF awards manager

The following analyses show the number of RSCG certificates issued in the year ended 30 June 1986:

Four Metres and Down certificates (last year's issues in parentheses)			
Category	Number	Total Issued	
70MHz Standard Transmitting	3 (51)	152	
70MHz Senior Transmitting	2 (11)	54	
144MHz Transmitting	17 (121)	728	
144MHz Senior Transmitting	18 (24)	255	
144MHz Senior Receiving	0 (11)	6	
432MHz Standard Transmitting	18 (11)	225	
432MHz Senior Transmitting	15 (12)	124	
1.3GHz Standard Transmitting	8 (10)	71	
1.3GHz Senior Transmitting	3 (31)	15	
Supreme Award (qualification: three Seniors or two Seniors plus one 1.3GHz)	5 (6)	166	

FMD Microwave Distance Award for initial contact beyond specified QRB (last year's issues in parentheses)			
Category	Number	Total Issued	
1.3GHz 600km	14 (12)	104	
2.3GHz 500km	3 (1)	16	
3.4GHz 400km	1 (0)	4	
5.6GHz 300km	0 (0)	1	
10GHz 150km	7 (2)	79	
Total of Four Metres and Down Certificates issued in the year: (114 (121))			

QTH Squares Awards (last year's issues in parentheses)			
Category	Number	Total Issued	
70MHz 20 squares and 4 countries certificates	2 (2)	12	
70MHz 25 squares and 6 countries stickers	2 (1)	7	
70MHz 30 squares and 8 countries stickers	11 (2)	3	
70MHz 35 squares and 10 countries stickers	0 (1)	2	
144MHz 40 squares and 10 countries certificates	34 (56)	216	
144MHz 60 squares and 15 countries stickers	20 (23)	118	
144MHz 80/18 stickers	12 (10)	166	
144MHz 100/20 stickers	12 (18)	79	
144MHz 125/20 stickers	6 (6)	25	
144MHz 150/20 stickers	3 (1)	14	
144MHz 175/20 stickers	1 (1)	7	
144MHz 200/30 stickers	2 (0)	6	
144MHz 250/35 stickers	1 (0)	2	
432MHz 30 squares and 6 countries certificates	11 (14)	51	
432MHz 40/10 stickers	4 (7)	33	
432MHz 50/13 stickers	5 (3)	20	
432MHz 60/15 stickers	5 (2)	11	
432MHz 70/15 stickers	4 (4)	16	
432MHz 80/15 stickers	2 (3)	8	
432MHz 90/15 stickers	2 (0)	2	
432MHz 100/15 stickers	1 (0)	1	
Total: 47 initial certificates and 81 stickers (72 and 66 in 1984/5).			

Microwave Squares Award			
Category	Number	Total Issued	
1.3GHz 5 squares basic certificates	9 (10)	64	
1.3GHz 10 squares sticker for above	5 (11)	51	
1.3GHz 15 squares sticker	7 (6)	33	
1.3GHz 20 squares sticker	3 (5)	24	
1.3GHz 25 squares sticker	4 (8)	21	
1.3GHz 30 squares sticker	4 (1)	14	
1.3GHz 35 squares sticker	2 (1)	7	
1.3GHz 40 squares sticker	1 (2)	9	
1.3GHz 45 squares sticker	1 (2)	4	
1.3GHz 50 squares sticker	2 (0)	4	
1.3GHz 55 squares sticker	11 (1)	1	
1.3GHz 60 squares sticker	0 (0)	0	
1.3GHz 65 squares sticker	0 (0)	0	
1.3GHz 70 squares sticker	0 (1)	1	
2.3GHz 5 squares sticker	4 (1)	12	
2.3GHz 10 squares sticker	1 (1)	4	
2.3GHz 15 squares sticker	1 (1)	3	
2.3GHz 20 squares sticker	1 (0)	2	
2.3GHz 25 squares sticker	0 (1)	2	
2.3GHz 30 squares sticker	0 (2)	2	
3.4GHz 5 squares sticker	0 (1)	2	
3.4GHz 10 squares sticker	0 (1)	1	
3.4GHz 15 squares sticker	1 (0)	1	
10GHz 5 squares sticker	2 (2)	25	
Total: 48 Microwave Squares Awards and stickers (slightly down on last year's total of 57).			

Monday Night 70cm Activity Night Awards 1985/6: 24.

In addition to the above, the vhf awards manager issued large numbers of contest certificates upon instructions from the VHF Contests Committee.

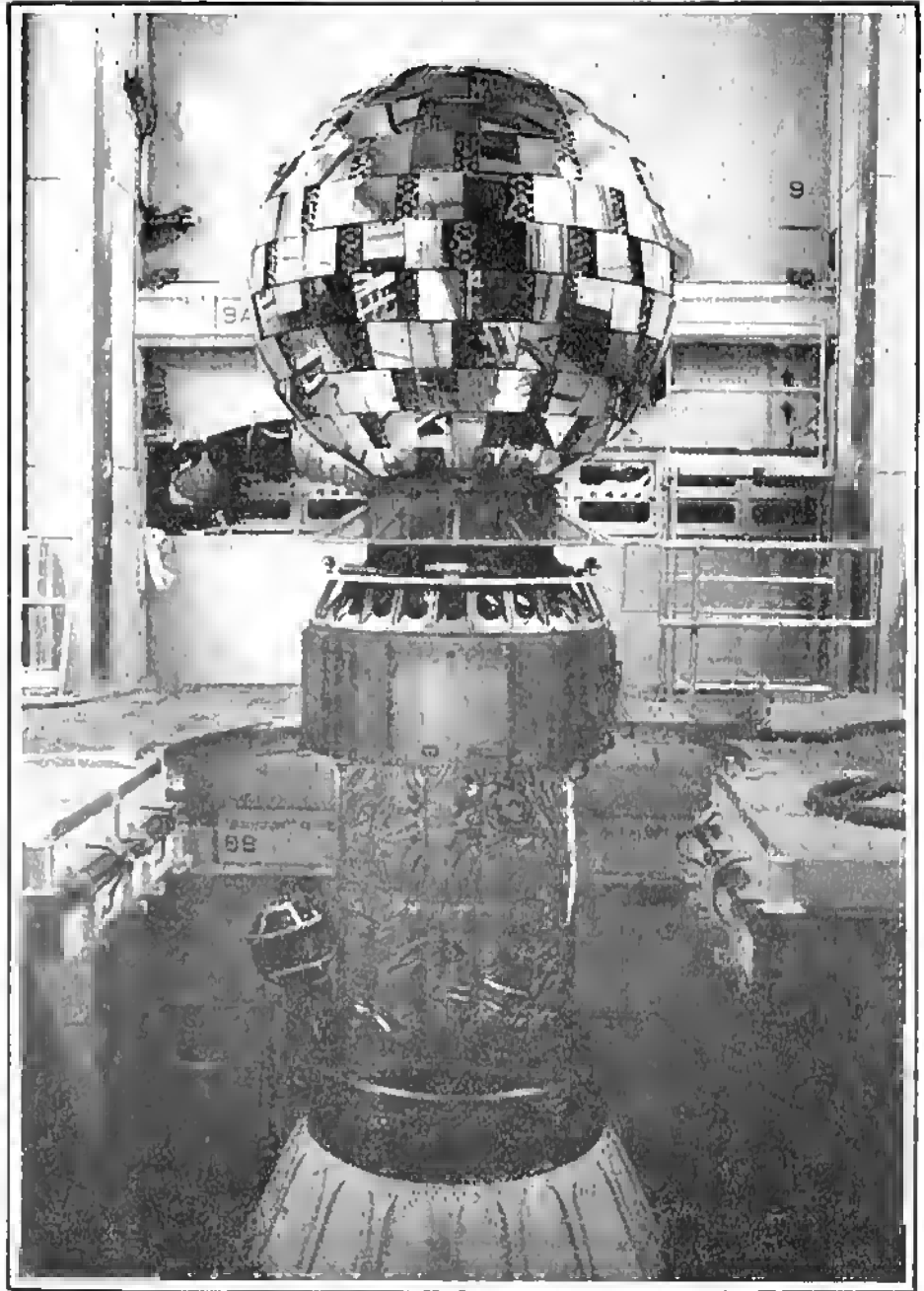
Jack Hum, G5UM

FO-12 UPDATE

The JAS-1 satellite, which has now been re-named Fuji-OSCAR 12, is working very well indeed - uplink in Mode JA is 145.9-146 MHz, downlink 435.9-435.8 MHz via inverting linear transponder. Downlink power is up to 2 watts PEP EIRP.

Together with the terrific picture on this month's front cover we couldn't resist showing this extra one of JAS-1 in all its glory just prior to launch - actually the original is in colour and, to be honest, we had a job deciding whether or not to use it on the front cover instead! In case you're wondering, the ball-like object at the top of the pic is called "Ajisai", which translates roughly as "Flashing Flower" - in more sober language it's the Experimental Geodetic Payload or EGP. This was launched along with JAS-1 and it's basically a sphere just over 2 metres in diameter carrying corner reflectors and mirrors. These are targets for the laser tracking stations taking part in the experiment; what happens is that laser pulses lasting between 200 picoseconds and a few nanoseconds are bounced off the Flashing Flower, and measuring the round-trip time of the pulses gives a very precise indication of the distance between it and the observer. The laser tracking is so precise that the data has to be corrected for the 1.07 metre distance between the corner reflectors and the centre of mass of the satellite!

Although we haven't seen it yet (skies very overcast here at Potters Bar) the Flashing Flower ought to be easily visible to the naked eye. According to some Japanese information, the ball is rotating at about 40 rpm and, with the geometry of the mirrors, you should be able to see 6 flashes per rotation, i.e. 2 per second, each



of which lasts about 5 milliseconds. If you're interested in astronomy, the apparent brightness of the satellite is somewhere between 1st and 4th magnitude - for non-astronomers like us, one magnitude unit is around 4 dB and 1st is brighter than 4th. According to our local observatory in North London, on a

clear moonless night in the country the naked eye can see stars down to 5th or 6th magnitude.

So if you're running software to tell you when FO-12 is within range and the weather's right, you might well be able to see the EGP experiment twinkling away - if you can tear yourself away from your radio, that is!



The photograph above was taken at the recent wedding of RSGB staff member David Gough, G6EFQ, to Chrissie Horlock from Perth, Western Australia (VK6 land). Seen left to right are - David's brother Nigel, G6EFR; David, G6EFQ; Chrissie; David's godfather Tom Tatton, G2BSR; and father Ron, G3AWK.

DUBUS - get yours here

DUBUS is the invaluable and authoritative newsletter for serious VHF/UHF operators. Its distributor in the UK, Kenneth J Hatton, G4IZW, has changed his address, which is now as follows:

Hamilton House
Carleton
CARLISLE
Cumbria
CA4 0AD
Telephone: 0228 20786

DUBUS issue 3 has recently been posted to subscribers, and subscriptions for 1986/7 are now being accepted. The 1987 subscription will be £8, because of increased costs and the fall in sterling against the Deutschmark.

BARTG update

The British Amateur Radio Teleprinter Group has announced the following changes.

John & Pat Beedie, GW6MOJ and 'MOK, now handle components and publications in addition to their existing jobs of membership secretary and "Datacom" distribution.

Stuart Dobson, G3PPD, is continuing to assist with the development of BARTG components and publications.

BARTG has asked us to say that copies of 1985 issues of "Datacom" are available at the bargain price of £1.50 each, or £5 for the complete set of four issues. Prices include postage & packing.



PIRATES

GW4SLK reports that his callsign is being pirated on 1.8 MHz SSB - the real GW4SLK only uses 10 and 14 MHz CW.

G6HAW is being heard in the London area; however, that callsign - which was actually GW6HAW - was replaced in April 1984 by GW4XKE.

A pirate believed to be in Bedfordshire is using G4IWA for HF, RTTY and AMTOR - the real G4IWA lives in Warwickshire.

G6AFB reports an abusive pirate operating with his callsign in the Norfolk area. The real G6AFB did live in Downham Market until January this year but he is now resident in Merseyside.

Finally, Dan Smith, GW3OJB/9M8FDS, reports receiving QSL cards claiming contacts with 9M8HG, who has actually been a Silent Key for several years; Dan had been one of his QSL managers. The QSL cards either suggest a very active pirate or confusion with a similar callsign being used from near Kuching.



Can we come too?

As in previous years (see the Annual Report in this issue for more on this topic) the Society intends to fly the flag at as many rallies and exhibitions as possible during 1987. The Headquarters staff involved in this side of our operations are currently sharpening their pencils and getting ready to prepare their master list of where they're going and when, and they need your help. If you'd like the Society to be at your event in 1987, drop a line now to Tim Charles of the Circulation Department at RSGB Headquarters. Tell him what rally it is, where it is and on what day of the week it'll be and we'll do our best to be there.

Only problem is that if we went to every rally and exhibition in the calendar we'd never get any other work done and we'd probably also make a thumping loss financially speaking - so, much as we hate it, we'll probably have to decline a few invitations. Forgive us in advance if we can't get to your event, but as we've said we'll try our best. Let's hope to see YOU at the rally.



RAYNET

busy after earthquake

On Saturday 11 October there was a major earthquake in El Salvador, which caused extensive damage in the capital, San Salvador. RAYNET was immediately involved in the aftermath of this event and was soon able to give the UK Foreign Office confirmation of the fact that there were no British casualties. Enquiries from the public did not build up to anything like the levels involved during the Mexico earthquake, and one HF operator was easily able to cope with them. RAYNET also gave updates on matters such as damage to communications; on behalf of the International Red Cross it was also able to pass on requests for drugs and supplies in time for them to be put on board a relief aircraft. Prestel was being extensively used for message handling, and was said by RAYNET Committee Chairman Geoff Griffiths, G3STG, to be working very well.

As we went to press RAYNET had received a request from the wife of the Salvadorean Ambassador to Britain to assist in the location of her mother and was busily engaged in this task.

More on this next month.

You're nicked, mate....

Early in August 1986 Harold Crawford, GM4VAN, of 150 Troon Avenue, East Kilbride, was fined £250 after pleading guilty to a charge of fraud. Crawford admitted forming a fraudulent scheme to obtain a City & Guilds of London Institute certificate with David Boyd, of 46 Evan Drive, Glasgow. Boyd had previously sat the Radio Amateur's Examination twice and failed. Crawford took the examination on Boyd's behalf at Leith Nautical College, Edinburgh on 13 May 1986; he falsely stated that he was Boyd and forged Boyd's signature. Boyd was fined £200.



MORSE TESTS

The following list shows the dates and locations of all the available test centres from 1 December 1986 to 30th January, as we went to press. If you want to take a test and any of the centres shown is within striking distance, send for an application form straight away. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSGB Headquarters in a few weeks. By this time we may well have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Gwent	Newport ARS HQ	1/12/86
Co Durham	Great Lumley	3/12/86
Guernsey C I	Guernsey APS HQ	4/12/86
Cheshire	Macclesfield	5/12/86
Somerset	Burnham-on-Sea	7/12/86
Northants	Tiffelfield, Northampton	10/12/86
Nottinghamshire	Mapperley, Nottingham	13/12/86
Gwynedd	Bangor	13/12/86
North Yorkshire	York	13/12/86
West Sussex	Horsham	14/12/86
Mid Glamorgan	Rhydyfelin, Pontypridd	11/01/87
Buckinghamshire	Bletchley, Milton Keynes	11/01/87
South Glamorgan	Penarth	20/01/87
Kent	Dover	21/01/87
Avon	Northville, Bristol	23/01/87
Leics	Wigston Magna, Leicester	24/01/87
Lancs	Oldham Rally	25/01/87
Herts	North Watford	30/01/87

It is likely that more centres will have been notified to RSGB Headquarters since we went to press, so do give us a call for an application form or for further details.

It might be worth noting something our Chief Examiner has passed on to us. A high proportion of those who fail the Morse test do so because of poor sending. Considering that beginners usually have much more trouble with learning to receive Morse than they do with sending it, this is slightly surprising. However, it's a fact that you might like to bear in mind as you're practising and generally getting ready for the great day. If you are having problems with sending, it wouldn't hurt a bit to ask people at your local club to give you a hand. Conversely, don't forget that you can practice as much as you like on the air under the terms of the Class B licence - the concession whereby you can practice Morse in that way is now permanent. If you need to brush up on the guidelines relating to using this facility, take a look at the May, June and July 1986 editions of the Bulletin.

RSGB Callsign Rubber Stamp Service (no, really...)

We're pleased to say that we can now supply individually made rubber stamps showing your callsign or RS number - just the job for adding to your stationery or personalising QSL cards. The stamps measure approximately 35 by 10 mm and have a screw-on handle. Cost is just £2.95 to members by post.

To obtain your own callsign stamp, send a cheque or postal order for £2.95 to RSGB Headquarters - don't forget to quote your callsign or RS number..... Stamps have to be individually made, so you'll need to allow something like four or five weeks for delivery.

RSGB'S 11-POINT EMC PLAN - DTI APPLAUDS

The 11-point plan which we mentioned in these pages a couple of months ago has been the subject of intensive activity here at Headquarters - we've been preparing for the enormous task of creating the database mentioned in the earlier piece and we've also been having lots of meetings to brief staff and volunteers involved.

For the sake of anyone who missed it last time round, we'd just like to remind members that a comprehensive set of filters is now available from Headquarters - one or more of these ought to sort out most ordinary breakthrough problems. Here's a run-down on what's available - and they've been thoroughly tested by members of the Society's EMC Committee to make sure that they're right for the job. We're stocking five individual types, as follows, all prices by post:

Model BB1 - a "braid-breaker" filter suitable for rejection of braid-borne interfering signals between 2 MHz and 50 MHz and it still possesses some useful rejection (15 dB) at 70 MHz. Its quoted rejection is 25 dB at 30 MHz or below. This filter has less insertion loss in Bands IV and V than most other filters (around 2 dB) and should be tried first in areas where those signals are weak. It is also useful in Band II. British Telecom equivalent FS74a. Order

as FIL1 - price £5.49 to members, £6.46 to non-members.

Model HPF2 - a high-pass filter for Band II (i.e. VHF/FM broadcast) with low insertion loss above 88 MHz and rejection better than 50 dB below 30 MHz. This filter is only effective on the inner of the feeder cable and therefore its main use will be where strong HF signals are directly affecting the tuner circuitry. It could be combined with BB1 to reject braid-borne interference as well. HPF2 has no known British Telecom equivalent. Order as FIL2 - price £5.49 to members, £6.46 to non-members.

Model HPF1 - this filter combines the braid-breaking action of the BB1 and the high-pass filter action of the HPF2. However, it is only suitable for use in Band IV and V (i.e. UHF television) since it has a high insertion loss below 300 MHz - if you need the combined filter action below that, use a combination of BB1 and HPF2. Specified rejection at 30 MHz is better than 60 dB, although our sample measured 50 dB, and usable passband is from 400 MHz upwards. HPF2 still has some usable rejection (about 10-15 dB) up to 200 MHz, so it might be useful if you run HF and 144 MHz. Near British

Telecom equivalent FS72a. Order as FIL3 - price £6.05 to members, £7.12 to non-members.

Model TNF2/2 - this is a 144 MHz tuned notch filter which will reject 144 MHz signals on both the inner and the outer of coaxial feeder cable whilst passing all other signals. It is suitable for all UHF television channels in Bands IV and V with low insertion loss, although in Band II it still has between 3 and 5 dB - so it might not be suitable in fringe areas. Rejection better than 35 dB on the inner and 30 dB on the outer. Better than near British Telecom equivalent FS64/1a and 2a. Order as FIL4 - £6.23 to members, £7.33 to non-members.

REF1/70 - this is a 430 MHz tuned notch filter which will reject signals on the inner of the coaxial feeder cable. It has insignificant insertion loss to broadcast signals except in group A of Band IV, where slight signal degradation may be noticed. It has about 20 dB rejection, and in severe cases two could be cascaded. Not quite as good as British Telecom type FS73a but a fraction of the cost! Order as FIL5 - price £5.49 to members, £6.46 to non-members.

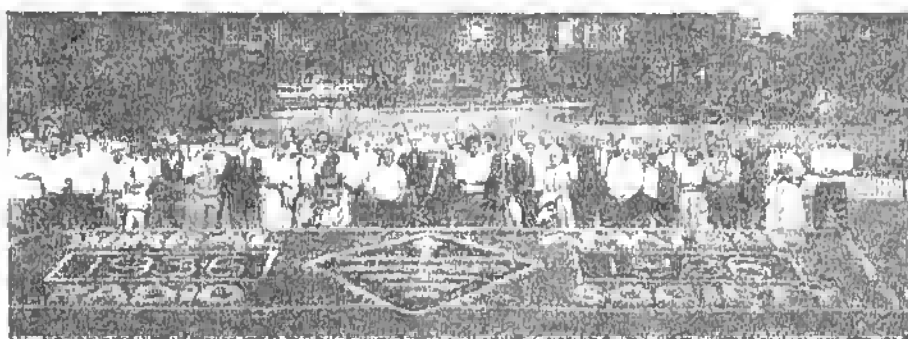
For clubs and groups we're also offering a special kit of 11 filters at £46.50 if you're affiliated, £54.70 if you're not! Order code FKIT.

And finally - don't forget the ever-popular RSGB ferrite rings, which from what we hear seem to work really well. Price £2.54 to members, £2.99 to non-members per pair.

Talking about EMC, it seems the DTI rather liked our approach. In a letter dated 29 September the Head of Licensing, Mr M V Coolican, said that...

“.....I have read with great interest the Society's 11-point plan and should like to congratulate you on this most positive and comprehensive approach to the problem of EMC. As you say the plan should form a firm foundation on which the Society and the Department will be able to work together.”

We have a meeting with the Department scheduled for later in October, in which we'll be starting to tackle some of the issues which have been raised in this area - more on this next month.



The photograph above shows members of the Wirral Amateur Radio Society and friends standing behind a floral decoration in Hamilton Square, Birkenhead. The decoration - set out by the gardeners of the local Leisure Services Dept - is to mark the Golden Anniversary of the society.

ARE YOU CLEAN?

Members who are regular VHF/UHF operators will know that our allocations at 144 MHz and above are very close to those used by other services. Given that amateurs are often using higher effective radiated powers than professionals in adjacent parts of the spectrum, it's obviously vital that our transmissions are as clean as possible - i.e. they don't produce RF energy on frequencies which they're not supposed to, or at any rate not much.

The following illustrates the problems which can crop up in this age of rigs with transistor PA stages. A member of Headquarters staff recently blew up the PA of his TS700 - yes, he had been a Very Silly Boy and yes, TS700s don't much appreciate being run flat out on FM into a dead short-circuit..... Now our man is quite technically competent enough to replace a PA transistor and - as it happened - he also had access to a reasonably well-equipped RF test area. He replaced the PA transistor and tuned everything up for maximum RF output. He then thought that a quick look on a spectrum analyser wouldn't hurt a bit - but imagine the shock and horror when a "comb" of frequencies about 9.5 MHz wide promptly appeared on the screen at only about 20 dB below the proper 144 MHz output! If he'd gone on the air with that he'd probably have had the emergency services, the Radio Investigation Service, the Ministry of Defence and heaven knows who else queueing up on his doorstep with coshes, jemmies, crowbars and wits. A very quick tweak, which made hardly any noticeable difference to the power output indicated on the mega-accurate Bird digital power meter, sent most of the spurious straight down into the analyser's noise floor at about -80 dB apart from the usual couple at about -65 dB. Sighs of relief all round.

Joking apart, it's most important that we're aware of the potential hazards of "tweaking" driver and PA stages without access to a spectrum analyser. Obviously that sort of test gear isn't found in the average shack and probably the average amateur doesn't have access to one - so what we're saying is that if you do have problems with the "power" stages of a transmitter or transceiver it might be better to let your local friendly dealer sort them out. Certainly the main importer for a particular make will no doubt have all the necessary test gear to ensure that your rig's transmitted output will be as clean as

TOP BAND - give these a miss

Bearing in mind that the 1.8 MHz band is shared with other services, the Society is sometimes asked whether a list of coast stations and frequencies in use on the band is available. We've just received an up-to-date list of frequencies to be avoided by amateurs using Top Band.

Here are the frequencies to avoid in Top Band. Note that all are used for SSB except those marked with an asterisk; these are used for RTTY. All are in regular use except those in brackets, which are available for use when required. "W" indicates a working frequency.

CALLSIGN	LOCATION	FREQUENCIES (kHz)				
GNI	Niton, IOW	(1831)	1834	(1911)	(1922)	(1925)
GLD	Land's End	1841w	(1908)	(1911)	(1925)	
GIL	Ilfracombe	(1852)	1855			
GLV	Anglesey	(1911)	(1922)	1925		
GPK	Portpatrick	(1880)	1883w			
GHD	Hebribes	1866w				
GKR	Wick	(1824)	1827w			
GND	Stonehaven	(1853)	1856w	1946		
GCC	Cullercoats	1838	(1841)			
GKZ	Humber	(1866)	1869w			
GNF	North Foreland	(1845)	1848w			
Guernsey	Radio	1810w				
EJM	Haln Head	1841w				
EJK	Valentia	1827w				
OST	Ostende	1817w	1820w	1905	1908	*1971.5
OSA	Antwerpe	1901w	1904			
PCH	Scheveningen	1862w	1890w	*1919.5	1939w	(1971)
			*1972.5	(1995)		
DAN	Norddeich	1911				
DAO	Kiel	1880	1883	1915	1918	
OXB	Blavand	1813				
FFU	Brest	(1894)	(1995)			
FFO	St Nazaire	1817	(1995)			
FFC	Bordeaux	1820	1862w			
FFM	Marseilles	1906w	1988			
TKM	Grasse	1834	1988			

In addition to these, 1950 and 1953 kHz, both J3E/USB, are assigned to all UK coastal radio stations.

As a matter of interest, the Society understands that the frequencies which tend to suffer interference from stations in the amateur service are 1820, 1841, 1852 and 1953 kHz, with the latter being much the most commonly affected. 1955 kHz is often used by amateurs, but we'd suggest that in that part of the band it'd be wiser not to operate LSB below about 1960 kHz to avoid interference.

possible. It's also worth remembering that most rigs on the market have a one-year guarantee, so if the worst comes to the worst and you do have a major nasty early on in its life it won't cost an arm and a leg to get it right.

Every transmitter ever made has some spurious outputs - it's just a matter of how many and how strong with reference to the intended one. In theory, a case could be made out for amateur VHF and UHF equipment to be designed to a target of no spurious emissions more than -80 or -90 dB but that certainly wouldn't be easy to achieve.

At this stage we wouldn't want to do more than to draw members' attention to the potential

problems, but please do bear in mind that - especially as far as 144 MHz is concerned - there is a good deal of professional activity just above and below the band. Some of this belongs to the emergency services, and any interference with them could be nothing short of disastrous. If you have access to a spectrum analyser, or if someone in your club does, it might be worth checking your VHF or UHF rig to see whether it's as clean as it should be. Alternatively, several rallies now feature equipment measuring facilities, and a quick look at the output spectrum of your favourite VHF rig might be well worth the effort.

MORE BULL....

In case you hadn't noticed, the Bulletin's grown again. We've been getting feedback which suggests that you quite like the Bulletin and the things in it, so we've been twisting arms and scraping about in the bottom of the piggybank with a view to expanding it. Result is that we've now got a regular eight pages for news and features. You'll find the Member's Ads towards the back of the magazine - we've split them off from the Bulletin itself to make space for more news and you'll also find the columns of forthcoming events on the last page of the Bulletin itself - we call it the "Events Diary". Don't forget that - for the moment at least - we only publish what people ask us to. The actual "Diary of Events" lives in our computer and it's the master list of what's coming up in the world of amateur radio. It's what we look at when you ask us whether the proposed date for your forthcoming rally will clash with A N Other's, for instance. What we'll probably do later on is to publish a month's worth of the master Diary of Events, and we'll need your help to keep that absolutely up-to-date. Do let us know about any forthcoming event you have in mind so that the computer knows about it and therefore Headquarters as a whole does. Having said that, space is always at a premium so please don't send us a two-page press release on the Lower Darrowby Parva Rally - if you're lucky it'll get condensed into three lines and if you're not it'll be two.

We hope you like the Bulletin - do let us have your comments, pro or anti, so that we can make it as interesting and useful as possible. We'd especially welcome good black-and-white pix of anything newsworthy, especially from clubs and groups. If you've been up to something, do tell us so that we can tell the world.

We also have ideas for other changes to the magazine but they're highly classified at the moment - watch this space!

Get CONNECTed

A quick reminder that the first edition of our newest newsletter, CONNECT INTERNATIONAL, is available now - it covers the world of packet radio. Annual UK members' sub is £7.20, although the common renewal date is 1 July so initial cost from November to July is £4.80. Like to subscribe? Send £4.80 to the Circulation Department at RSGB HQ, and make the cheque payable to RSGB. Other rates on request.

CQ DX 9M6

The Sabah Amateur Radio Society in East Malaysia has been reformed recently by a small and active group of enthusiasts. With the exception of Don Macleod, 9M6AE (GM4DGS), all of the members are Malaysian citizens; there are a few licensed amateurs and 15 or 20 short wave listeners, some of whom are presently studying for the Malaysian Telecoms Amateur Exam.

A club station is being planned at the local Scouts' HQ but things are hampered by the lack of equipment and funds. Many of the local enthusiasts find the current cost of amateur equipment is prohibitively expensive which means that there are just three 9M6 operators (9M6MO, 9M6MA and 9M6MU) currently active in the HF bands.

In an attempt to put Sabah firmly on the DX map, Don wonders if there are any DX Foundations or individual amateurs willing to donate some HF or VHF equipment to this small and dedicated group. Any donation would stimulate enthusiasm locally and would put some good DX on the air. Offers of help should be directed to Don Macleod, c/o Sabah Ports Authority, Headquarters Building, 88617 Kota Kinabalu, Sabah, East Malaysia.

Don received his 9M6 reciprocal call sign after exactly one year's wait and he expects to be resident in Kota Kinabalu for about another two years. He has a Yaesu FT201, is currently erecting a mini-quad antenna and is normally active on 20m SSB.



Above: Members of the Sabah ARS.

Back row (l to r): SWL/ SHL/ SWL/ SWL/ 9M6NS/ SWL/ 9M6WM/ SWL/ 9M6SP/ 9M6MO;

Front Row (l to r): SWL/ 9M6MA/ 9M6AD/ 9M6ML/ 9M6MU/ Don Macleod, 9M6AE/ SWL.

USA tickets - three pounds....

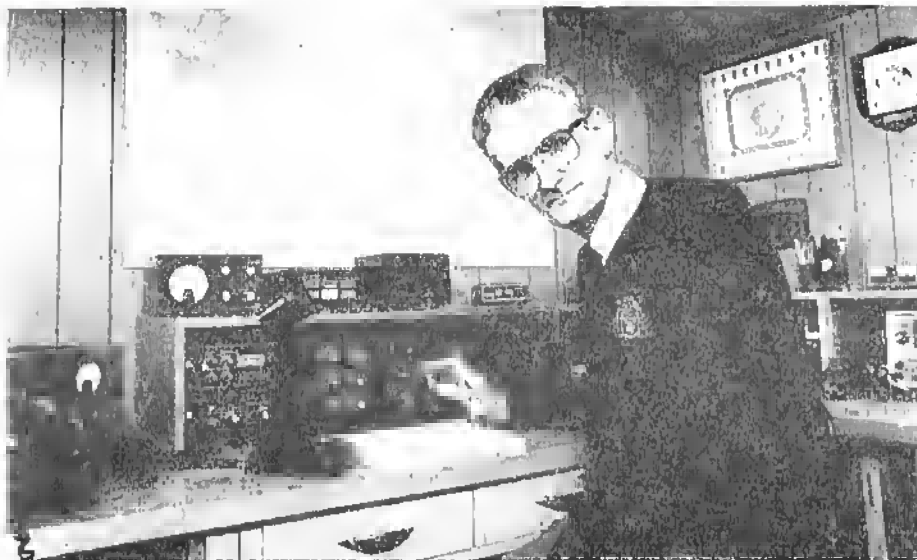
There will be a team of US Volunteer Examiners (VEs) at next year's NEC exhibition to administer the CH and theory tests for the full range of US licences, from novice to Extra Class. Anyone interested should contact the UK co-ordinator, Greg Lambert, G0/KK1J, at 27 Redcliffe Road, London SW10 9NP or 01-352 2746. The test fees are approximately £3.00, and it might be worth noting that tests are also held from time to time in the Harrogate area.

The Society has a small stock of the necessary licence (or should it be "license"?) preparation manuals

- more details from Tim Charles in the Circulation Department at RSGB Headquarters.

The full US licence is valid for ten years; if you're in the USA it allows you access to 146-148 MHz, which isn't normally available to reciprocal licensees from Region 1, i.e. the UK.

**MEMBERS' ADS
NOW ON
PAGES 804-808**



ROTAB Trophy winner

The winner of this year's ROTAB Trophy is Mr John D Forward, G3HTA (see pic). John first realised the fun of DX as a young SWL in the late 'forties, armed with a one-valve TRF receiver. Licensed in September 1951 and guided by local DX enthusiasts, DXCC country chasing soon became John's main pursuit, together with building new equipment and trying to improve antenna performance at his rather poor location. As one of the four members of the G3YWX Contest Group, John tasted success in 1971 when the group was first in the world in the CQ WPX Contest. Both this and many other firsts were achieved by

teamwork and planned development.

Ten years ago John moved to the top of a hill in mid-Devon, with plenty of space for antennas. That has the result of boosting his DXCC score, which now stands at 335 countries - at the moment there is no activity from the two which remain! However, he still derives plenty of enjoyment on the nine bands on which he works, even at sunspot minimum.

John's off-air interests include forecasting conditions, introducing newcomers to DX-chasing and perpetually seeking to improve the station and its antennas.

RSGB BOOK NEWS

No apologies whatsoever for another blatant sales pitch for our books this month - we've got a basement full of them and they're all pining for good homes, so do the decent thing and lay hands on an RSGB book or two.

First off, the new Callbook is out - no, we're not making a mistake and this isn't 1987 already, this is the October 1986 edition - the second this year. There are something like 10,000 changes and additions, and as with the previous edition there's loads of useful material at the front of the book.

The good news is that this brand-new October 1986 edition is the SAME PRICE as the earlier one - how's that for value?

The other magnificent new book which we now have available is Angus McKenzie's "Buyer's Guide to Amateur Radio". This one really is a must for all amateurs - young and old, experienced or not, mega

technical or not technical at all. This book is nothing less than reviews of most of the commercial rigs which are in anything like wide use, and there are a few revealing comparisons with those of yesteryear. It really is ace, and every shack should have one - you can get yours for £6.16 over the counter or £6.88 by post. If you have any non-member friends (shame on you), it'll cost them £8.09 by post and £7.25 over the counter, together with free membership application form...!!

And finally - coming soon, the brand-new "EMC Manual". This is a total rewrite and update of the old "TVI Manual" with lots of new information on EMC problems and how to solve them. Book Department's working flat out and we hope to have it available early in 1987 - no prices yet though. Watch this space for more info as soon as we have it.

P.S.

The date of the
Oldham Mobile Rally was
given incorrectly in last
month's RadCom.

The correct date is
Sunday 25 January 1987.

Forthcoming Morse test
centres in London SE26
and Newcastle-under-Lyme
see next month's column.

Farewell to the MSF
standard frequency
transmissions on 2.5, 5
and 10 MHz on 29 February
1988, operational since
1953. Popular 60 kHz
transmissions with
encoding of year, month,
day, hour & minute in no
danger, however.

OSCAR 10 now considered
to be unrecoverable, alas
- over 2000 software
errors in last 10 weeks,
so not even a simple
command program possible.
Beacons still active on
145.810 & 145.978 and
sending gibberish - no
transponding. Expected
final power-down by time
you read this. Cause two
things - incorrect
inclination on launch,
putting it in Van Allen
belt too long on each
orbit, also greedy users
not giving command
stations enough time to
retake control....

DIARY

Mobile Rallies

9 NOVEMBER 1986

Bridgend & DARS Rally - Bridgend Recreation & Leisure Centre, Angel Street, Bridgend, Mid-Glam. Opens 10.30am (10 for disabled). Talk-in on S22. Details GW10UP, tel: 0656 723508.

23 NOVEMBER

West Manchester RC Winter Rally - Pembroke Halls, Walkden, Worsley, Gtr Manchester. Details GL100, tel: 0204 24104, evenings.

7 DECEMBER

Verulam Christmas Rally - The City Hall, St. Albans. Open 11am-5pm. Talk-in on S22 and SU8. Details G4JKS, tel: St. Albans 59318.

14 DECEMBER

Leeds & DARS Christmas Rally - Pudsey Civic Centre, Dawsons Corner, Pudsey. Opens 11am (10.30 for disabled). Talk-in on S22. Trade enquiries G4WYD, tel: 0274 685039. Details GLEBS, tel: 0274 665355.

25 JANUARY 1987

Oldham Mobile Rally - Queen Elizabeth Hall, Civic Centre, West Street, Oldham. Opens 11am (10.45 for disabled). Talk-in on S22. Details G4ZEP, tel: 061-624 7354. Morse tests must be hooked via RSGB HQ.

9 FEBRUARY

Bury RS Hamfest - Mosses Youth & Community Centre (minutes from the M66), Cecil Street, Bury, Lancs. Details G1PKO, tel: 061-764 5018.

28 FEBRUARY

Rainham Radio Rally - Bredhurst R&TS, Parwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. (5 mins from M2 junc.4) Talk-in on S22, GB4RRR. Opens 10am. Free car park. Admission 50p. Details G1LKE, tel: Medway (0634) 362154.

IN BRIEF - More details later.

1 MARCH

Welsh Mobile Rally - Leisure Centre, Barry, S. Glam. Details GWBCMU, tel: 0446 711426.

7 MARCH

Tyneside ARS Blue Star Rally - High Gosforth Pk, Newcastle-upon-Tyne. Details G6VEG, tel: Tyneside 2866908 or G4KOT, tel: 2341148.

8 MARCH

Wythall RC Rally - Wythall Pk, Silver Street, Wythall. Details GOEYO, tel: 021 430 7267.

15 MARCH

South Essex ARS Mobile Rally - The Paddocks Community Centre, Canvey Is, Essex. Details G4FMK, tel: 0268 683805.

25th NARSA Amateur Radio & Electronics Exhibition - Belle Vue, Manchester. Details G6CGF, tel: 051 630 5790.

28/29 MARCH

RSGB National Amateur Radio Convention - National Exhibition Centre, Birmingham.

5 APRIL

Pontefract & DARS Components Fair - Carleton Community Centre, Pontefract. Details GOAAO, tel: 0977 43101.

24 MAY

Maidstone Mobile Rally - Maidstone YMCA, Sports Centre, Melrose Close, Maidstone. Details G6FZD, tel: 0622 50709.

14 JUNE

Elvaston Castle Mobile Rally - Elvaston Castle Country Pk, nr Derby. Details G4PZY, tel: 0332 767994 or G4CTZ, tel: 0332 799452.

12 JULY

Worcester & DARC Droitwich Mobile Rally - High School, Droitwich. Details GOAOC.

2 AUGUST

RSGB Mobile Rally - Woburn Abbey, Woburn, Bedfordshire.

Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldswick. Details, G4ILG, tel: 0282 812288 or 0282 813271, daytime.

13 SEPTEMBER

Lincoln Hamfest - Lincolnshire Showground, Lincoln. Details G8VGF, tel: 0522 25760

27 SEPTEMBER

Harlow Mobile Rally - Harlow Sports Centre. Details G4KVR, tel: 0279 22365, daytime or G3UEG, tel: 0279 27788, evenings.

Other Events

6 DECEMBER

RSGB Annual General Meeting - Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

GB Calls

To 31 DECEMBER - GB2RIP

Celebrates 11th Centenary of the granting of the Charter by King Alfred the Great to the City of Ripon. Most evenings on HF CW/SSB, 144MHz FM. Other modes/bands possible. QSL via RSGB. WAB SE37, Maidenhead IO94FD. Details GOCLY.

2 NOVEMBER - GB1CPU

At 'Computerations 86', Brixham Community College, Higher Ranscombe Road, Brixham. Joint venture between Brixham Computer Club and South Devon RC. Open 10am-6pm. Talk-in on S22. Details GLTNP, tel: 0803 314962, or G6ZRM.

3-9 NOVEMBER - GB4PW

Operation of this station has been cancelled for security reasons on the advice of the Royal British Legion MS Secretary.

15 NOVEMBER - GB2WGG

Dunstable Portable ARC and Dunstable Downs RC, at Watford Grammar School for Girls' annual fete. Private sponsorship on number of contacts, all proceeds to the school. Contacts with other schools welcome. Bands: 1.8, 3.5, 14 and 144MHz SSB/CW. Details GOCOG, tel: 0582 508259.

16 NOVEMBER - GB4PRS

Poole RAS 10th anniversary celebrations from the Haven Hotel, Sandbanks, Poole, Dorset. Mainly 3.5MHz SSB/CW, other HF bands depending on conditions, and 144MHz SSB/FM, 0900 to 2000GMT. WAB SZ08. Locator IO90AQ (ZK21g). Details GOEQV, tel: 0202 674802.

17/22 NOVEMBER - GB1CIN, GB2CIN & GB4KLD

From York Minster in conjunction with BBC Radio York and the BBC's Children in Need appeal. Active on HF 80m-10m, and 2m. Station is being privately sponsored. QSL c/o BBC Radio York, 20 Bootham Row, York.

21/22 NOVEMBER - GB2IY, GB8SIR

Smiths Industries RS, Bishops Cleeve, Cheltenham. Mainly on 3.5, 14 and 144MHz. Details G4YIX.

24 NOVEMBER - GB4RC

At Rush Common Primary School, Abingdon, Oxon. Active on HF and 2m VHF throughout the day.

NOVEMBER - GBOWKS

Throughout the month to celebrate Cub Scout anniversary. Mostly on HF CW from Tunbridge Wells. Callsign worth five points for the West Kent ARS Award. Details G4KIU, tel: 0892 33586.

THE WORLD OF



FOR ONLY £2.50

ELECTROMAIL – A BRAND NEW WAY TO BUY RS PRODUCTS.

- Over 13,000 products from a single source.
- The quality range – proven by industry.
- Excellent stock availability.
- 24 hour ordering.
- 704 page catalogue.

Write or phone today for your copy of the new Electromail catalogue.

It's an invaluable technical reference packed with photographs and detailed descriptions of the complete product range.

Send £2.50 or, if phoning, quote your Access/Visa number.

The Electromail service is only available to UK customers.

ELECTROMAIL

Dept. 801, PO Box 33, Corby, Northants. NN17 9EL

TELEPHONE:

0536 204555



THE
EASY-TO-BUY
& ELECTRONIC
PRODUCTS
SERVICE

ELECTROMAIL

NEW
CATALOGUE -
NEW PRODUCTS
NOVEMBER 1986
EDITION AVAILABLE
NOW!

Batteries
Cables and accessories
Conduit and trunking systems
Connectors
Control and switchgear
Drafting aids
Emergency/safety lighting
Enclosures and accessories
Fasteners
Fuses & circuit breakers
Instruments
Integrated circuits
Optoelectronics/indicators
Power supplies
Printed circuit boards & fabrication
Relays, solenoids and sensors
Resistors and capacitors
Security & safety products
Semiconductors
Service aids
Soldering and desoldering
Speakers & microphones
Suppressors & filters
Switches
Technical books and videos
Timers, counters, controllers
Tools & production aids
Transformers and wound components
Wiring accessories
Workshop equipment



YAESU

THE NEXT GENERATION



NEW

Multimeter indicating "S" units, Power output, IC, LAC, FM tuning

Power switch

Manual PTT switch

Mic jack

Mic gain/Drive level

Noise blanker/Sq control

AF level/RF gain

VOX gain/switch

RF speech processor

I.F. monitor level control



FT-767GX

Automatic antenna tuner

Multipurpose keypad

Electronic keyer

Electronic keyer speed/CW carrier offset

I.F. notch/AF filter

IF shift/Audio tone

Main tuning

3 posn DIM switch

AGC time constant

SSB carrier shift

SUPER YAESU HF/VHF/UHF

Selector switches

Multimeter indicating Power Output, VCC, VSWR A.L.C.

LC meter

NEW

Power switch

Linear operate switch

Antenna Tune/Bypass switch

Auto-manual band select switch

Manual band control switches



FL-7000

Function status indicators

Band indicators

Antenna indicators

Antenna Tune/Load buttons

Antenna select buttons

*VHF-UHF units optional



South Midlands Communications Ltd.
School Close
Chandlers Ford Ind. Est.
Eastleigh, Hants SO5 3BY

YAESU MUSENS
ONLY AUTHORISED
DISTRIBUTORS

AMATEUR ELECTRONICS AE LIMITED
510-512 Alum Rock Road
Alum Rock
Birmingham B8 3HX

AE